Everywhere you imagine. RENESAS

Renesas QzROM Microcomputer for Home Appliance and Consumer Electronics Application Solutions

All future Renesas 4-and 8-bit Microcomputers will incorporate

QzROM!

QzROM

Adds usability of Flash ROM
to cost of Mask ROM !

QzROM → **Q**uick & Ea**sy**
(Quick Delivery) (Easy Programming)

Usability

$$\text{QzROM} = \text{MaskROM} + \frac{\text{FlashROM}}{2} !$$

Cost

$$\text{QzROM} \fallingdotseq \text{MaskROM}$$

QzROM

QzROM is effective for reduction of stock!

Ordinary products (MASK version)

Term-end stock (holding disused large stock) causes losses.

QzROM

By factory-programmed MCU and blank products, term-end stock problem is solved.

QzROM vs. FlashROM

	QzROM	FlashROM
Shipment of factory-programmed MCU by Renesas	O	O
Programming by user	O	O
On-board Programming	O	O
Starter Kit	O*	O
Additional programming (Free space)	O	O
Erase	X	O
Cost	O	△

*: Some products can't be supported.

What is QzROM Microcomputer?

Qz = Quick & Easy.

A newly developed form of non-volatile memory that allows

- use of the same chip in development and mass production;

- product shipment after shorter turn-around-times;

- a wider range of operating voltages;

- program protection;

-on-board programming; and

- realization of low power dissipation at waiting time.

- Quick & Easy

Quick (Quick Delivery) & Ea**sy** (Easy Programming)

Qz [kjÚ:zí:]

We've made a new logo.

The mascot of QzROM is Qz-kun.

- **Newly developed form of programmable memory**

QzROM is the programmable memory which diverted PROM technology corresponding to finer processes.
By high-value added functions, it realizes the equivalent price to the existing Mask version, and a programmed product is the same price as a blank one!

- **Identical chips in development and mass production**

QzROM eliminates the need for mask ROM version sample evaluation, since the same chip can be used in development (blank units) and mass production (programmed units)!

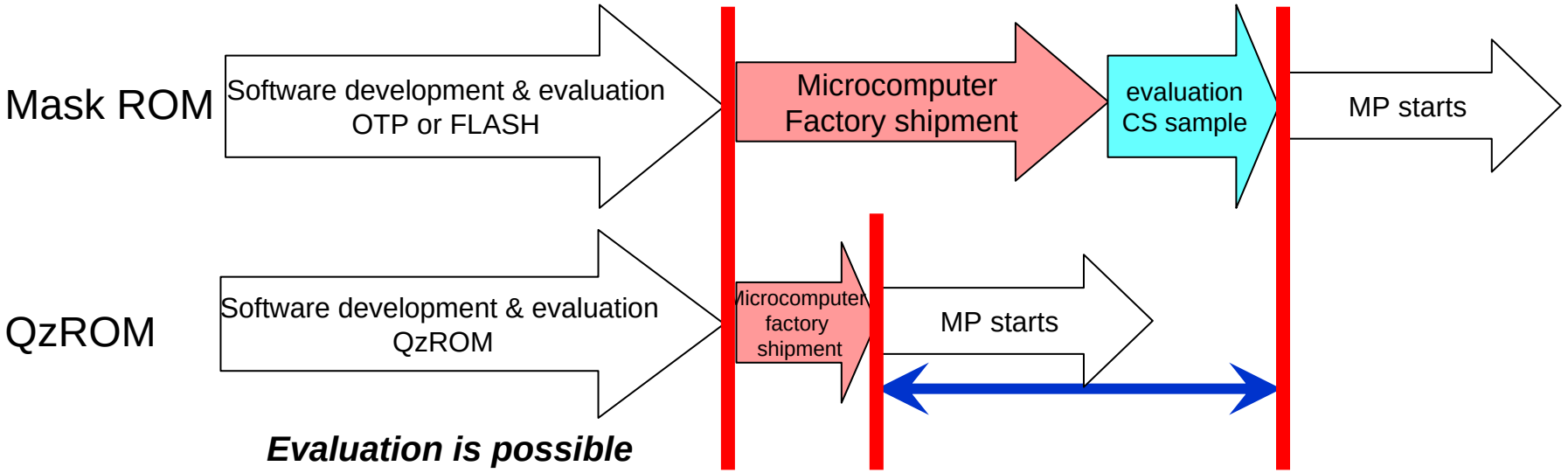
- Short TAT, Quick Delivery (1)

Shipment of factory-programmed MCU of QzROM is possible
as well as R8C/Tiny (Flash MCU).
With the QzROM production process, products can be shipped as quickly as 2 weeks, which is quicker than R8C/Tiny, from receipt of ROM.
(It makes it possible to deliver leading package options within a target period of 7 days!!)
Productization is possible whenever the customers want it.
(Microcomputer shipment won't be a bottleneck.)

Program development period is extended.
(Shorter period from ROM acceptance to shipment allows fuller debugging and evaluation and correspondingly more secure program quality.)

*However, it's on condition that the arrangement of shipment is ready after getting pre-forecast.

- Short TAT, Quick Delivery (2)



Evaluation is possible when most portions of software is completed! CS sample evaluation can be omitted!

Reduced development periods ! or longer evaluation periods for improved program quality!

- Expanded Operating Voltage Range

The operating voltage range of microcomputers which are available as blank products is conventionally 1.8V to 3.6V at 3V and 2.7 to 5.5 V at 5V.
QzROM will cover the whole range from 1.8 to 5.5 V, providing great flexibility in terms of operating environment and target application.
(The operating voltage range of the product depends on each product.)

- Protect function

QzROM incorporates a protection function that prevents unauthorized reading of both the customer program and the program input prior to Renesas shipment. This results in highly resistance to tampering.
(Shipment without protection and protection after additional data programming are possible.)

- On-board programming

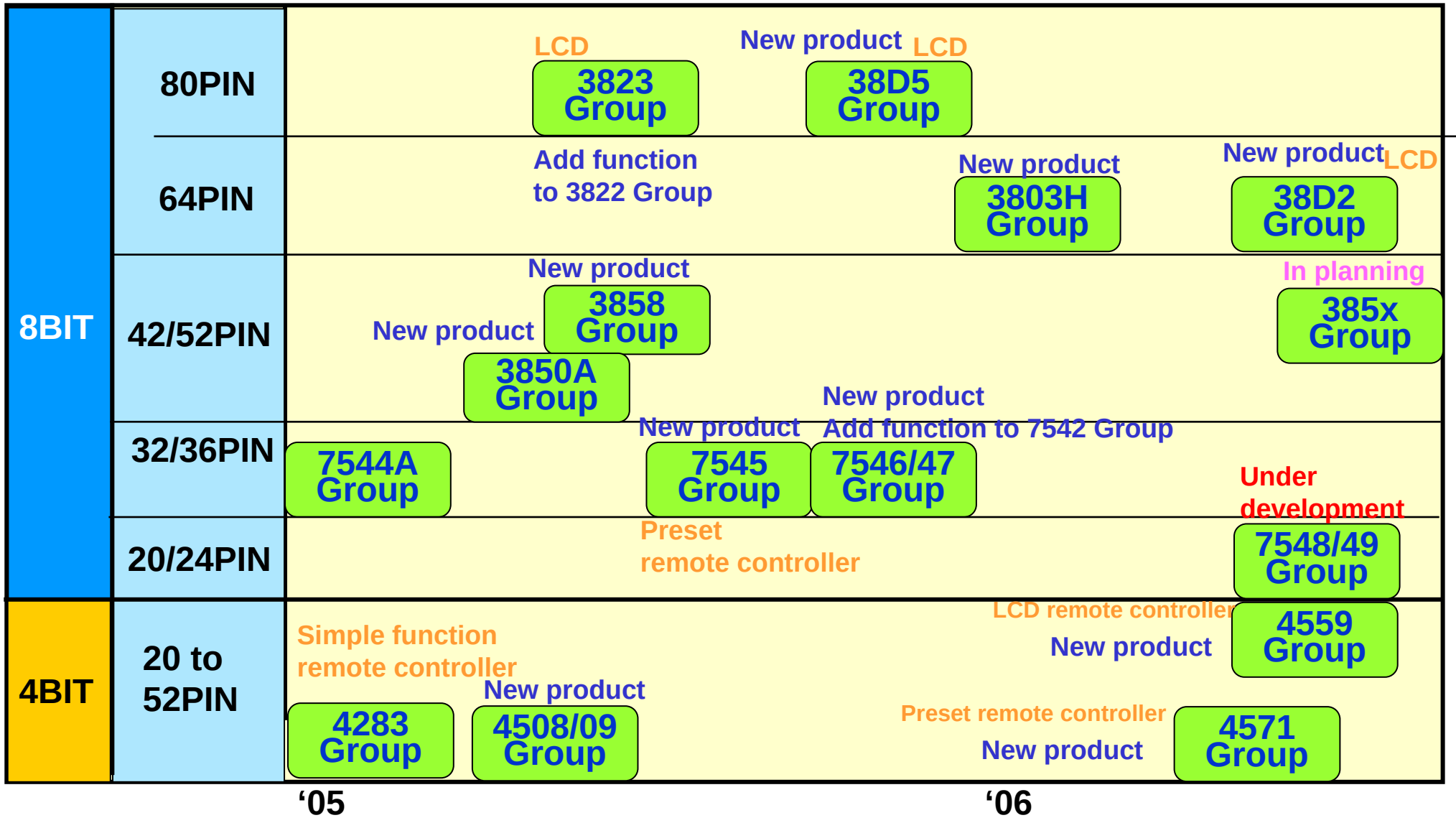
QzROM is perfect for software development projects on extremely tight schedules as it allows programming even after mounting as well as Flash MCU.
Additional data programming such as destination after shipment of factory-programmed MCU is possible.
(E8 will support it.)

- Low power consumption is realized at standby time.

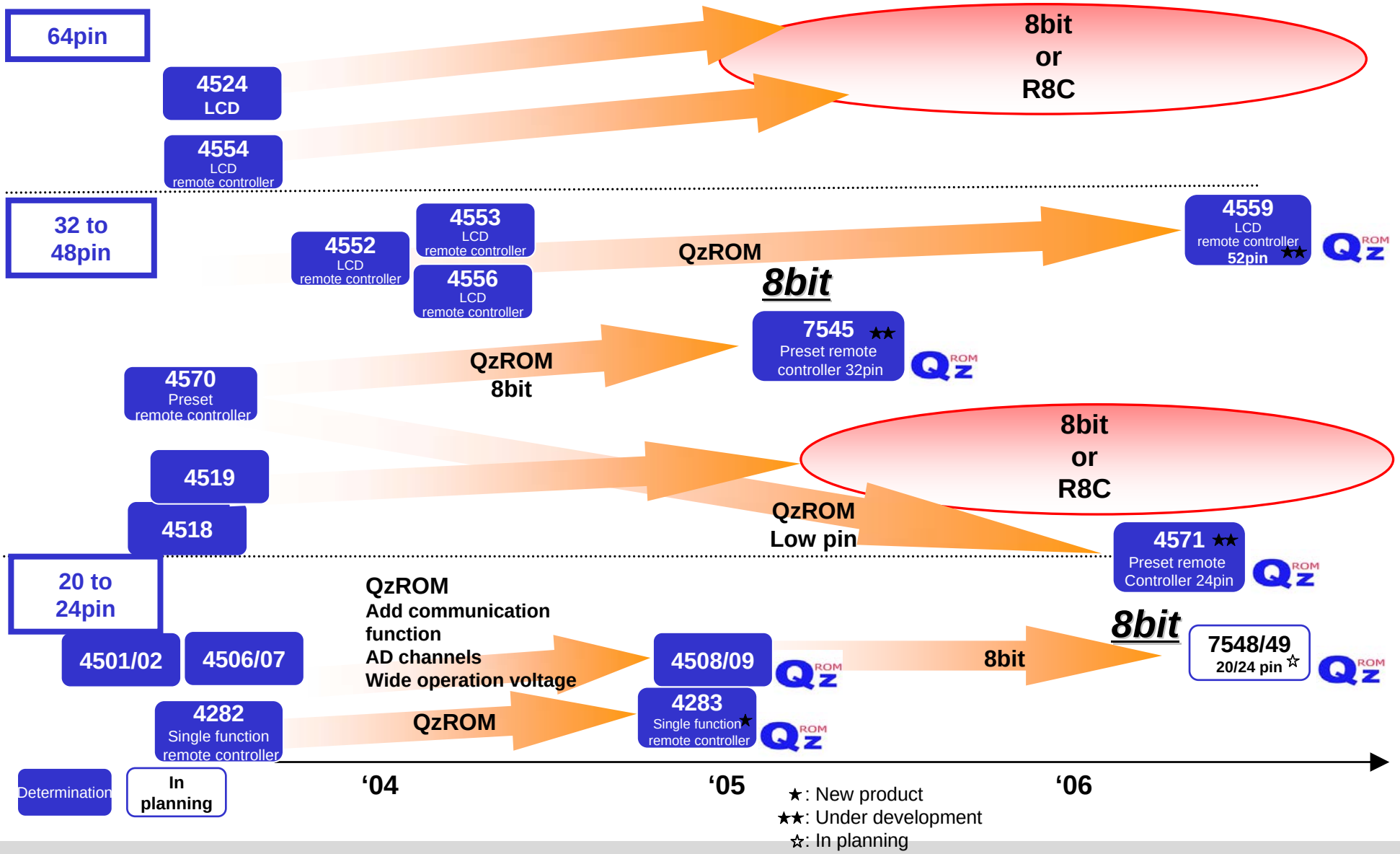
Flash microcomputers of Renesas in comparison with those of our competitors need little electricity to work at operating and standby time.
Even if compared with it, low power consumption is realized further.
Since especially the power consumption at standby time is low, it is suitable for portable devices, such as a battery drive etc.

QzROM Microcomputer Roadmap

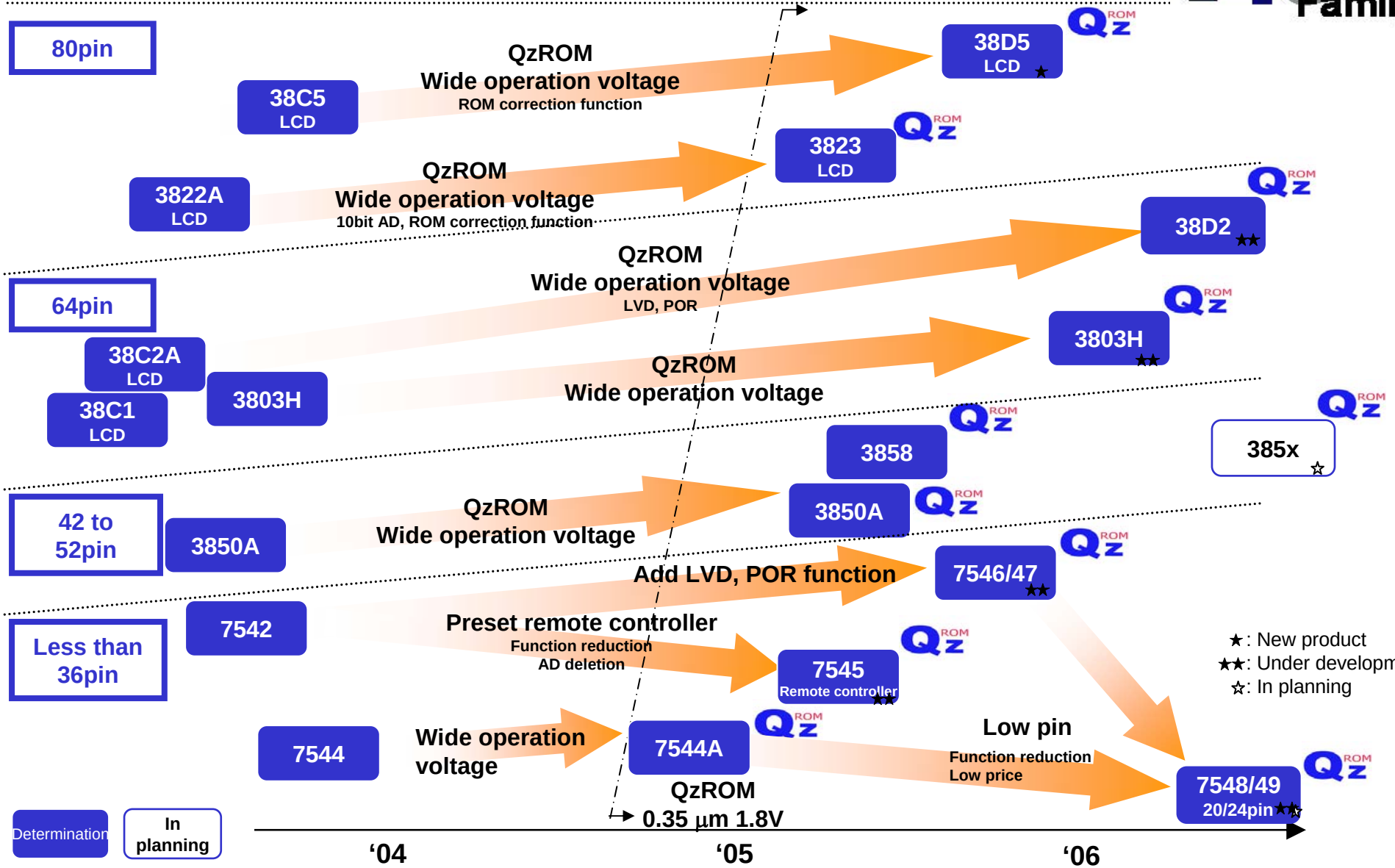
Roadmap (Futureデevelopment)



720 Family Medium Range Road Map



740 Family Medium Range Road Map

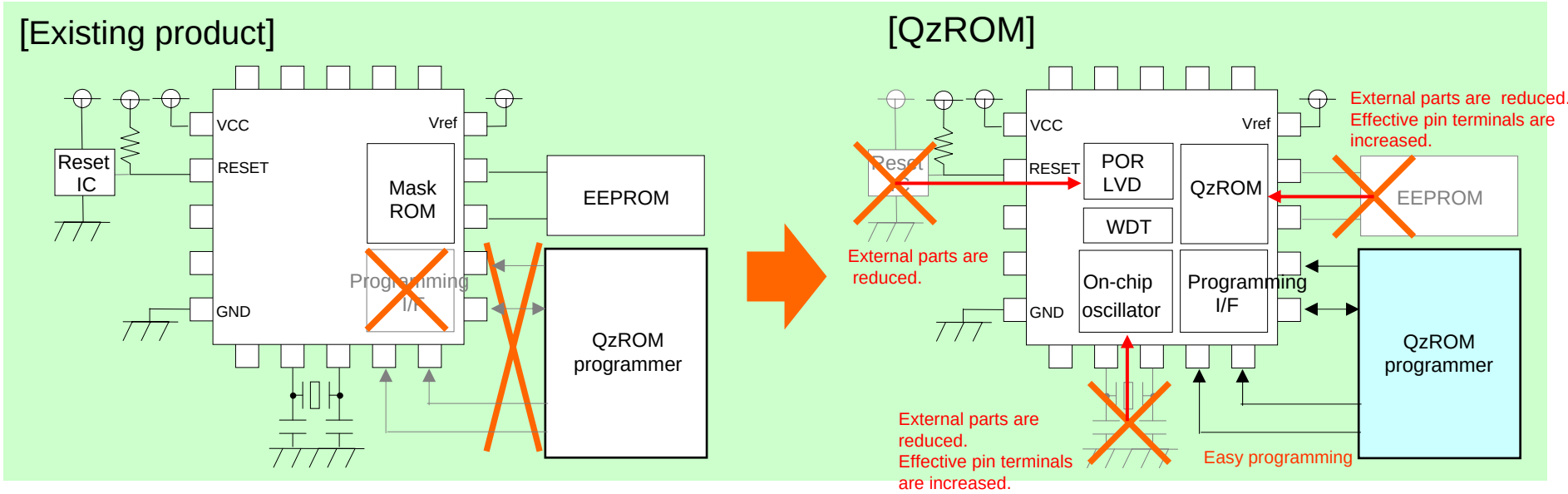


QzROM Microcomputer Characteristic Function to be added from now on

Characteristic peripheral functions and development planning of QzROM

-QzROM has expanded operating voltage range, low power consumption, highly tamper-resistance and high functional peripheral functions.

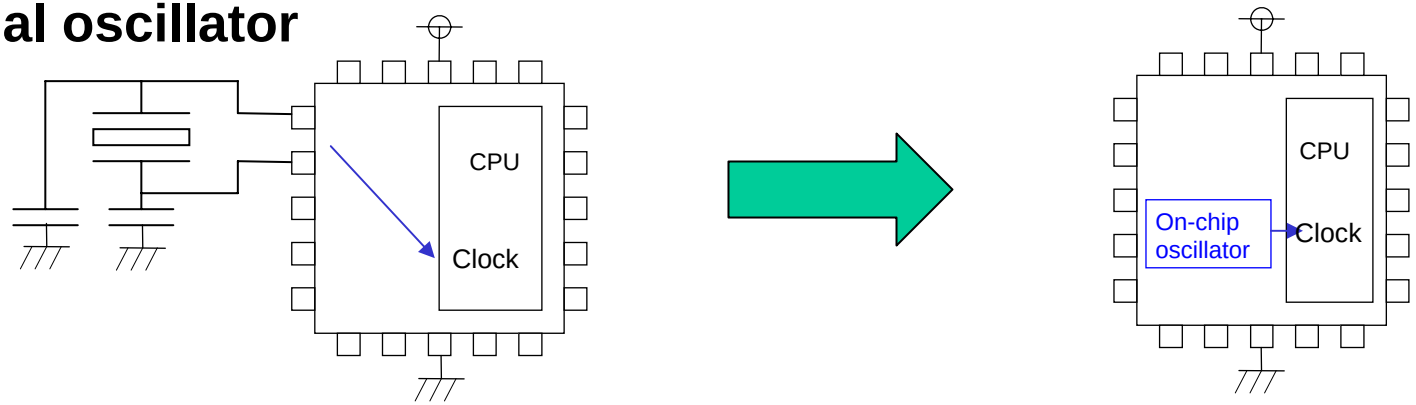
1) Reduction of external parts --- On-chip oscillator, POR, LVD, QzROM, etc.
2) High speed and high functional peripheral functions
   --- System clock: 8MHz, ROM correction circuit
   Division block protect function
3) Safety design --- Oscillation stop detection, WDT, protect function, etc.
4) Easy programming --- On-board programming,
   shipment of factory-programmed MCU



On-chip oscillator function, POR/LVD function

O Reduction of external oscillator

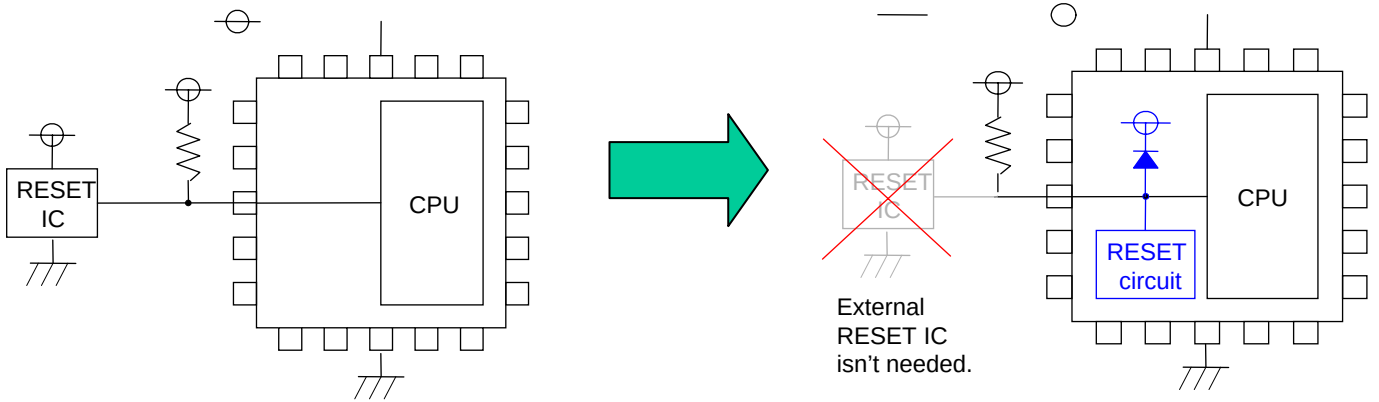
7544 32pin | 7545 32pin ★★ | 7546 32pin ★★ | 7547 36pin ★★ | 38D5 80pin ★ | 38D2 64pin ★★ | 7548 20pin ☆ | 7549 24pin ☆



Frequency of on-chip oscillator fluctuates depending on variations in manufacturing, voltage, and the temperature characteristics. High accuracy on-chip oscillator is to be equipped with 7548/49.

O Reduction of Reset IC

7546 32pin ★★ | 7547 36pin ★★ | 7548 20pin ☆ | 7549 24pin ☆



★: New product
★★: Under development
☆: In planning

Merit of additional programming of QzROM (1)

1. Data for destination

   The required data for destination is stored in external EEPROM.

2. Adjusted data such as sensors

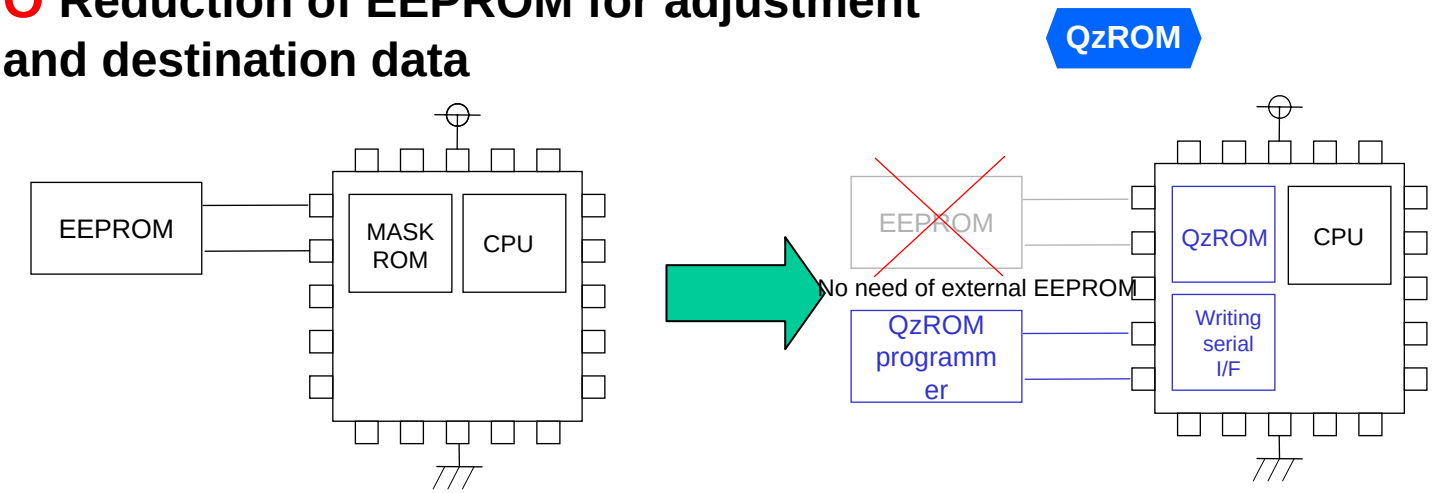
   It is necessary to acquire data after microcomputer is installed on product, and the data for correction is stored in external EEPROM.
   (Adjusted data is needed by each product.)

3. ROM correction

   Data for trouble avoidance is stored in external EEPROM.

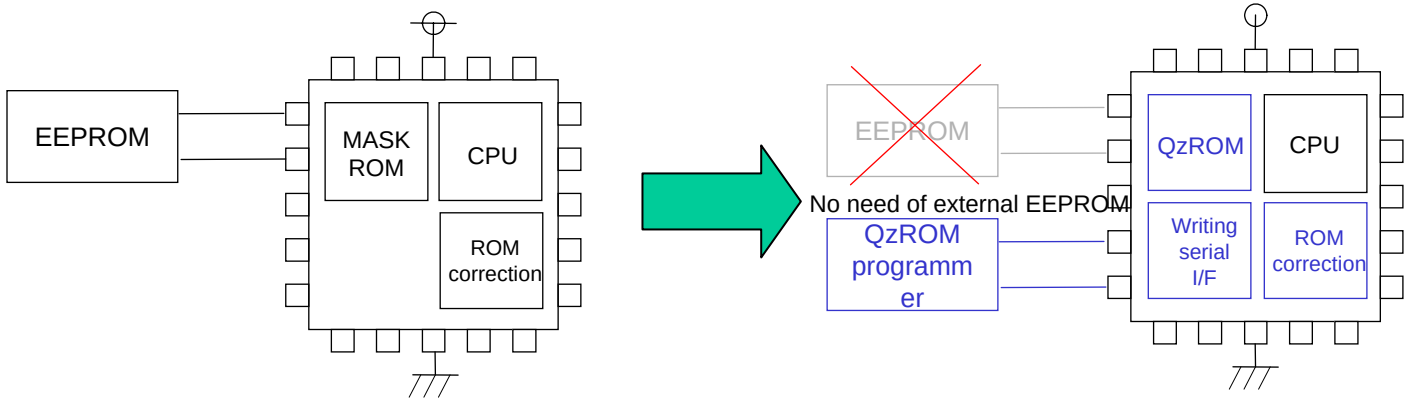
QzROM, ROM correction function

O Reduction of EEPROM for adjustment and destination data



O Reduction of EEPROM for ROM correction

3823 80pin ★ | 38D5 80pin ★ | 38D2 64pin ★★



★: New product
★★: Under development
☆: In planning

QzROM protect system

- Feature

QzROM has highly tamper-resistance as well as Mask ROM version.

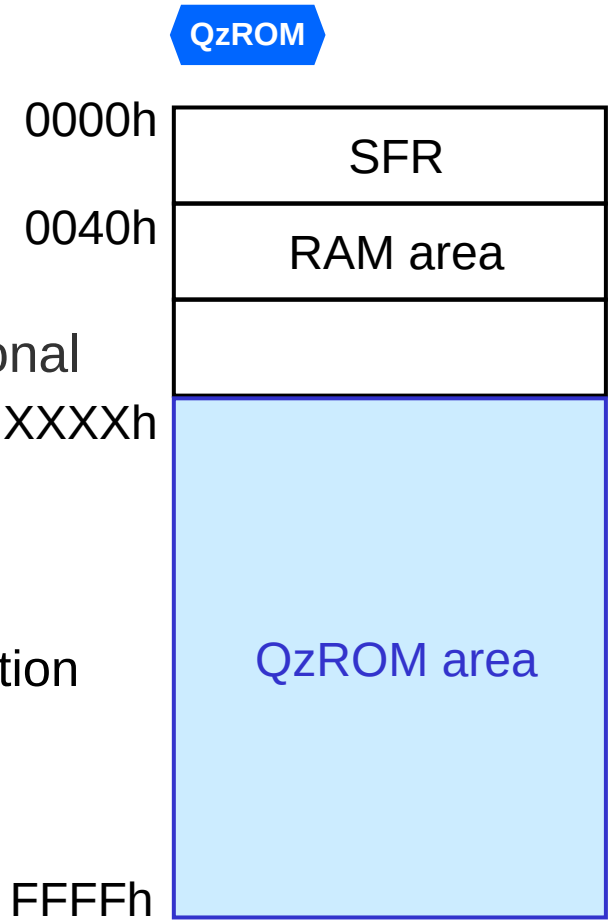
- Division protect

QzROM is perfect for additional programming on factory-programmed MCU.

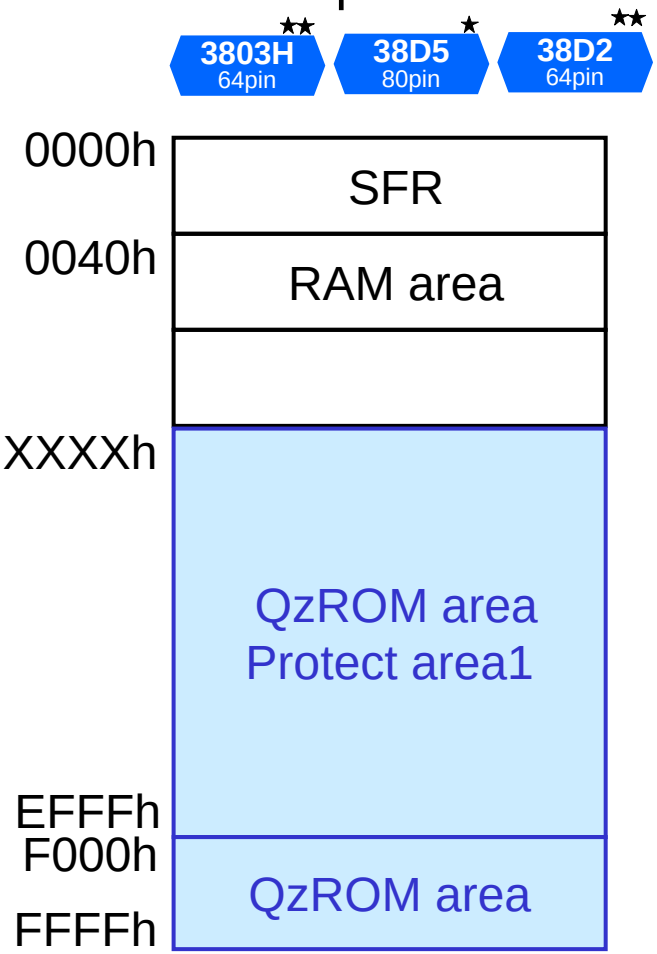
Application: adjusted and destination data, ROM correction

★: New product
★★: Under development
☆: In planning

O Total area protect



O Division protect



4-bit QzROM Microcomputer Product Lineup

M34283 Group (720 Series)

Features

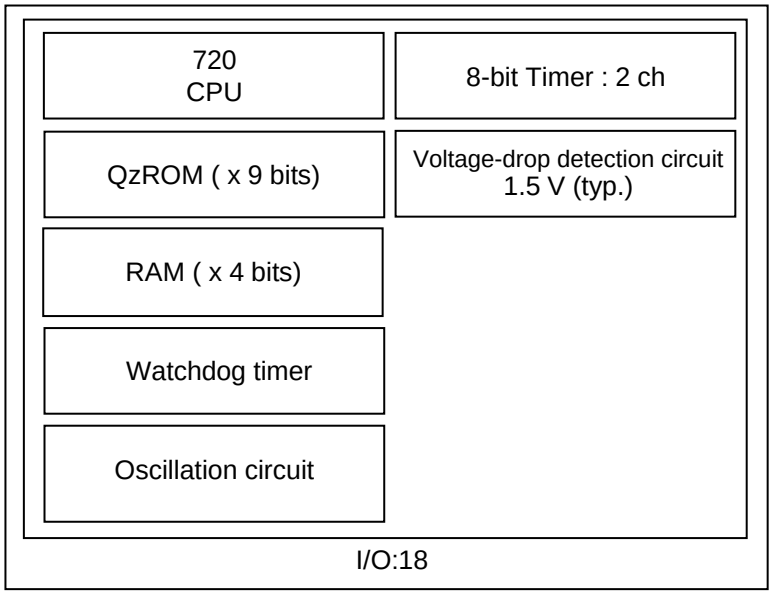
- Timer with automatic controller for carrier wave output and with carrier-wave generator enables efficient output of various waveforms for remote control
- Key-on wakeup function
- LED direct drive: 1
- Min. instruction execution time
  - 8.0 μs : f(XIN) = 4 MHz, system clock = f(XIN) /8)
- Power-supply voltage 1.8 to 3.6 V
- M34282 products are completely pin-compatible and software compatible.

Applications

- Single function remote control transmitter

Product Expansion ( ): ROM/RAM size

- M34283G2GP (2K/64)
- M34283G2-XXXGP (2K/64)
  GP : 20P2E/F-A : 20-pin SSOP (0.65mm pitch)



M34508/4509 Group

Features

- On-chip high-accuracy A/D converter
  - 10-bit resolution, linearity error ±2 LSB
- Comparison with the 4506/4507 group
  - C-MOS output is selectable by software
  - Highly functional timer with two reload registers
  - Serial I/O
  - Voltage-drop detection circuit (only H version)
  - A/D converter 2ch is added
  - Low-voltage operation A/D converter (2.0 to 5.5 V)
- Key-on wakeup function
- LED direct drive with large-current drive ports
  - 4508 Group : 4
  - 4509 Group : 6
  - Includes 2 (D0, D1) for large-current drive
- Clock generating circuit:
  - ceramic resonator / RC oscillation / on-chip oscillator
- Min. instruction execution time
  - 0.68 μs : f(XIN) = 4.4 MHz, High-speed through mode)
- Power-supply voltage: 2.0 to 5.5 V

It depends on operation source clock, oscillation frequency and operation mode.

Applications

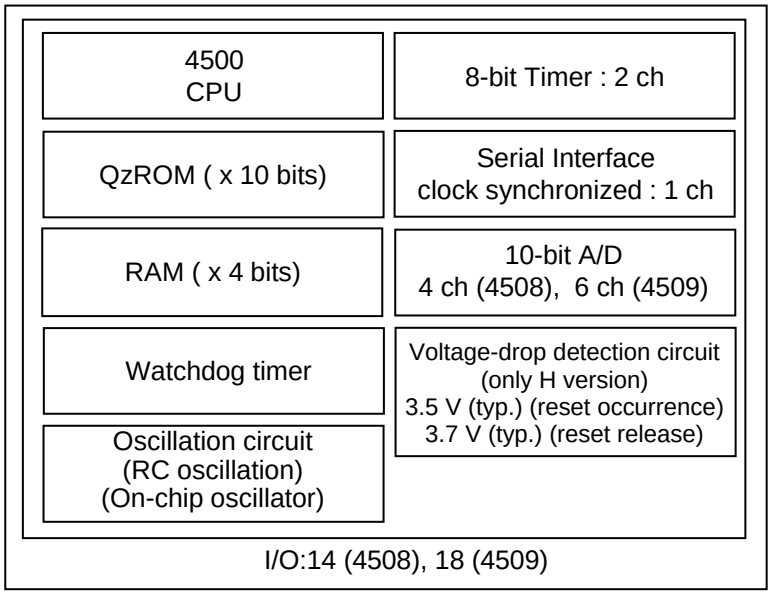
- Home appliances
  - Electric pots, Irons, Cleaners, etc.
- Consumer appliances
  - Portable audio system,
    Game machine pad, Charger, etc.

Product Expansion ( ): ROM/RAM size *: New product

- M34508G4FP* (4K/256) Hver : M34508G4H*
- M34508G4-XXXFP* (4K/256) Hver : M34508G4H*
- M34508G4GP*(4K/256) Hver : M34508G4H*
- M34508G4-XXXGP*(4K/256) Hver : M34508G4H*

  FP : 20P2N-A : 20-pin SOP (1.27mm pitch)
  GP : 20P2F : 20-pin SSOP (0.65mm pitch)
- M34509G4FP* (4K/256) Hver : M34509G4H*
- M34509G4-XXXFP* (4K/256) Hver : M34509G4H*

  FP : 24P2Q-A : 24-pin SSOP (0.8mm pitch)



M34571 Group

Features

- Timer with automatic controller for carrier wave output, and timer with carrier-wave generator enables efficient output of various waveforms for remote control
- Key-on wakeup function
- Min. instruction execution time
  - At system clock = f(XIN)
    0.5μs f(XIN) = 6MHz, VDD = 4.0 to 5.5 V
  - At system clock = f(XIN) /4
    2.7μs f(XIN) = 4.4MHz, VDD =1.8 to 5.5 V
- Power-supply voltage
  - VDD = 1.8 to 5.5 V
  (It depends on oscillation frequency and operation mode.)

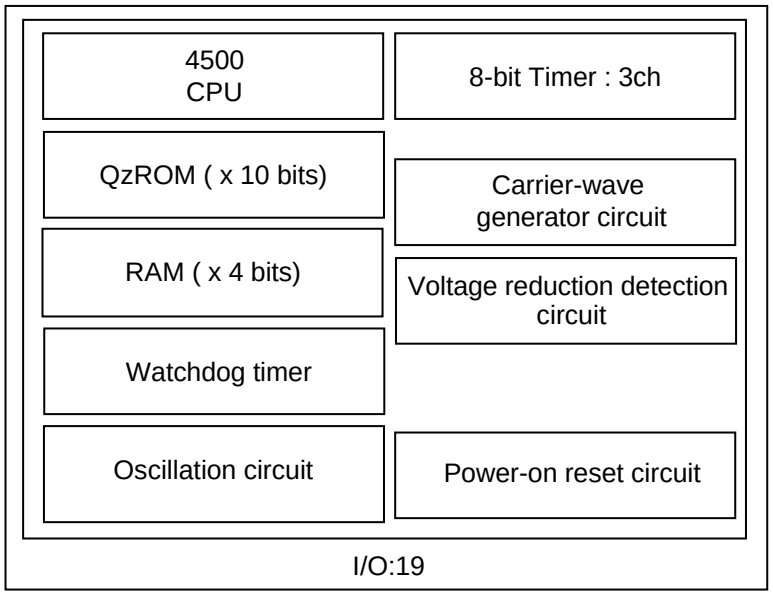
Applications

- Preset remote controller transmitter

Product Expansion ( ): ROM/RAM size **: Under development

- M34571G4FP** (4K/128)
- M34571G6FP** (6K/128)
- M34571GDFP** (16K/128)
- M34571G4-XXXFP** (4K/128)
- M34571G6-XXXFP** (6K/128)
- M34571GD-XXXFP ** (16K/128)

FP : 24P2Q-A : 24-pin SSOP (0.8mm pitch)



M34559 Group

Features

- Enhanced I/O port
  - ON/OFF control of pull-up transistor
  - Key-on wakeup function
- LCD common output pins are used as LCD segment output pins.
  - Circuit can be configured which considers LCD panel size etc.
- Min. instruction execution time
  - 0.5μs : f(XIN) = 6MHz, High-speed through mode)
- Selective oscillation circuit function (With built-in on-chip oscillator)
- Power-supply voltage
  - VDD = 1.8 to 5.5V

(It depends on oscillation frequency, operation mode and clock.)

Applications

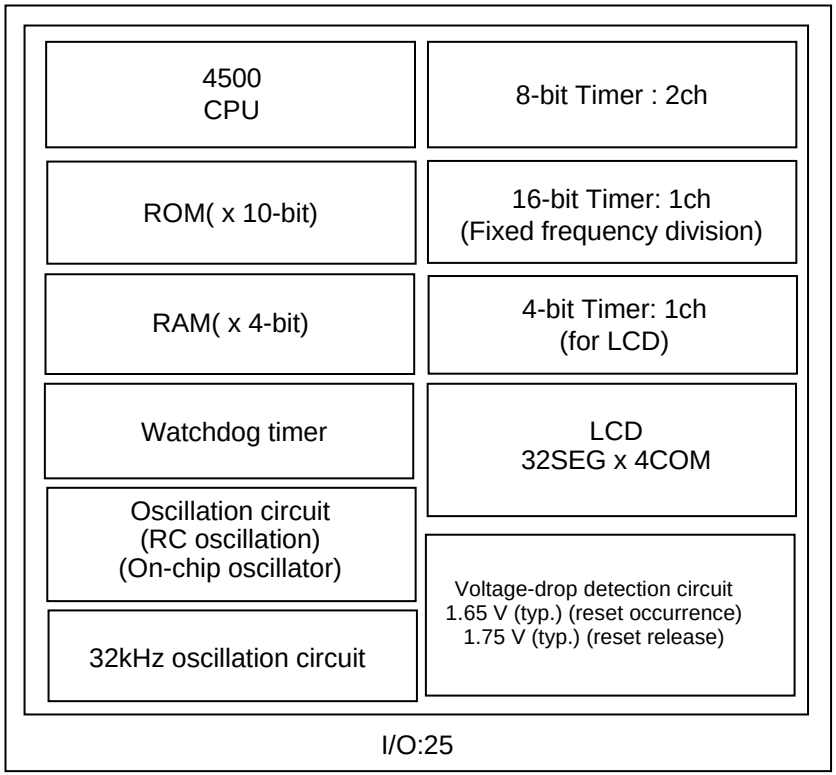
- Liquid-crystal remote control equipment

Product Expansion

( ): ROM/RAM size **: Under development

- M34559G6FP** (6K/288)
- M34559G6-XXXFP** (6K/288)

FP : 52P6A-A : 52-pin QFP (0.65mm pitch)



8-bit QzROM Microcomputer Product Lineup

M37548/49 Group

Features

- Min. instruction execution time: 0.25 μs
  (oscillation frequency of 8 MHz in double-speed mode)
- Smallest 20pin/24pin of 740 family
- Fail-safe: Oscillation stop detection circuit
- Abundant peripheral functions in spite of small package
- Voltage drop detection circuit and POR circuit
- Operating voltage (ceramic or crystal oscillation)
  - Vcc = 4.5 to 5.5V (f(Xin) = 8MHz, double-speed mode)
  - Vcc = 4.0 to 5.5V (f(Xin) = 8MHz, double-speed mode)
  - Vcc = 2.2 to 5.5V (f(Xin) = 4MHz, double-speed mode)
  - Vcc = 1.8 to 5.5V (f(Xin) = 2MHz, double-speed mode)
- Low power consumption
  - 8MHz, double-speed mode, Vcc= 5V: TBD
- Operating ambient temperature : -20 to 85°C

Applications

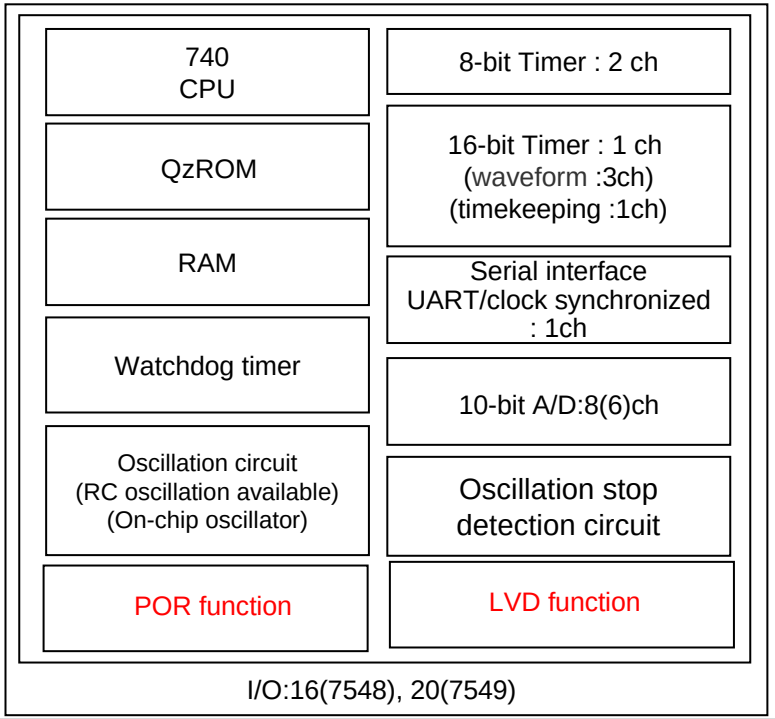
- Home appliances • Consumer appliances
- Industrial Equipment • PC peripheral OA equipment

Product Expansion ( ): ROM/RAM size

Under development

* * *:under consideration

- M37548G1-XXXFP*** (2K/128)
- M37548G1FP*** (2K/128)
- M37548G3-XXXFP*** (6K/256)
- M37548G3FP*** (6K/256)
  FP : 20P2F-A : 20pin SSOP (0.65mm pitch)
- M37549G1-XXXFP*** (2K/128)
- M37549G1FP*** (2K/128)
- M37549G3-XXXFP*** (6K/256)
- M37549G3FP*** (6K/256)
  FP : 24P2Q-A : 24pin WQFN (0.8mm pitch)



M37544A Group

Features

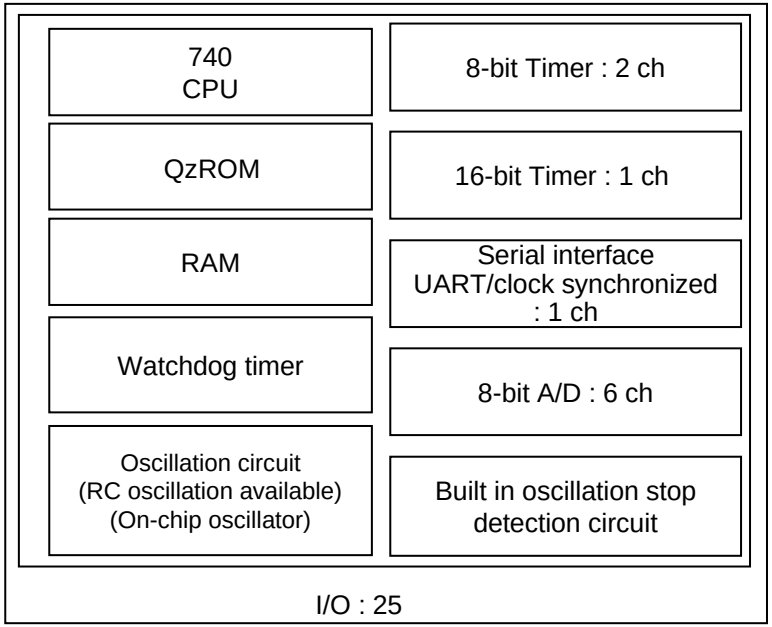
- Min. instruction execution time: 0.25 μs
  (oscillation frequency of 8 MHz in double-speed mode)
- Pin-compatible with 7540-group products
  (downwardly compatible)
- Support for QzROM version
  (on-board serial writing possible)
- High-speed operation
- Fail-safe: Oscillation stop detection circuit
- Abundant peripheral functions in small packages
- Operating voltage (ceramic or crystal oscillation)
  - Vcc = 4.5 to 5.5 V (f(Xin) = 8 MHz, double-speed mode)
  - Vcc = 4.0 to 5.5 V (f(Xin) = 8 MHz, high-speed mode)
  - Vcc = 2.4 to 5.5 V (f(Xin) = 2 MHz, double-speed mode)
  - Vcc = 2.4 to 5.5 V (f(Xin) = 4 MHz, high-speed mode)
  - Vcc = 2.2 to 5.5 V (f(Xin) = 1 MHz, double-speed mode)
  - Vcc = 2.2 to 5.5 V (f(Xin) = 2 MHz, high-speed mode)
- Operating voltage (RC oscillation)
  - Vcc = 4.0 to 5.5 V (f(Xin) = 4 MHz, high-speed mode)
  - Vcc = 2.4 to 5.5 V (f(Xin) = 2 MHz, high-speed mode)
  - Vcc = 2.2 to 5.5 V (f(Xin) = 1 MHz, high-speed mode)
- Operating voltage (on-chip oscillator)
  - Vcc = 1.8 to 5.5 V
- Low power consumption:
  Using the clock signal from the on-chip oscillator enables lower power consumption
- Operating ambient temperature: -20 to 85°C

Applications

- Home appliances • Consumer appliances
- PC peripheral OA equipment

Product Expansion ( ): ROM/RAM size

- M37544G2A-XXXSP/GP (8K/256)
- M37544G2ASP/GP (8K/256)
  SP : 32P4B : 32-pin SDIP (1.778mm pitch)
  GP : 32P6U-A : 32-pin LQFP (0.8mm pitch)



M37545 Group

Features

- Min. instruction execution time:
  2.00μs (oscillation frequency of 4MHz)
- Only QzROM version
(on-board serial writing possible)
- Operating voltage (ceramic)
  - Vcc = 1.8 to 3.6V (f(Xin) = 4MHz)
- Carrier wave generation circuit
- Watchdog timer
- Operating ambient temperature: -20 to 85°C
- LED output port: 10 ch
- Key-on wakeup: 8 input

Applications

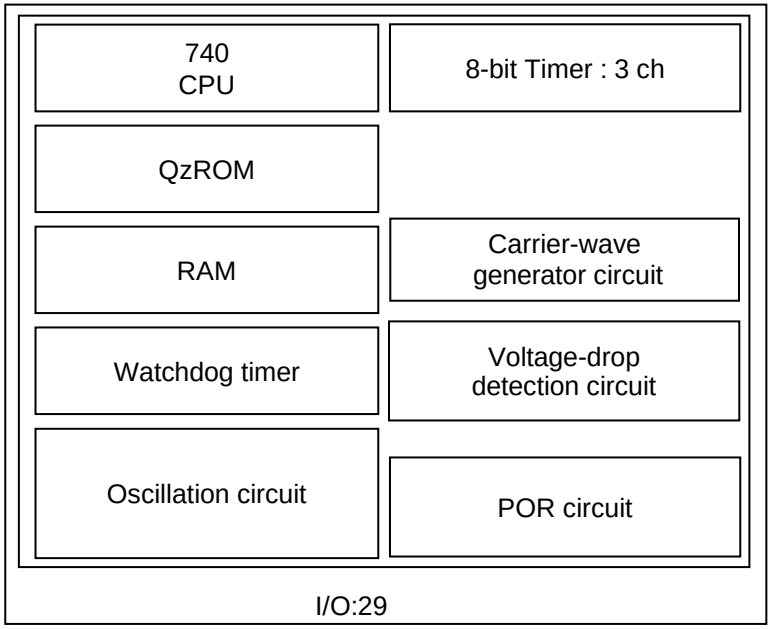
- Preset remote control transmitter

Product Expansion ( ): ROM/RAM size

**: Under development

- M37545G4-XXXGP**(16K/512)
- M37545G6-XXXGP**(24K/512)
- M37545G8-XXXGP**(32K/512)
- M37545G8GP**(32K/512)
- M37545G6GP**(24K/512)
- M37545G4GP**(16K/512)

GP : 32P6U-A : 32-pin LQFP (0.8mm pitch)



M37546/47 Group

New Product

Features

- Min. instruction execution time: 0.25μs
  (oscillation frequency of 8MHz in double-speed mode)
- Comparison with the 7542group
- Add voltage drop detection circuit and POR circuit to 7542 Group
- Fail-safe: Oscillation stop detection circuit
- Operating voltage (ceramic or crystal oscillation)
  - Vcc = 4.5 to 5.5 V (f(Xin) = 8 MHz, double-speed mode)
  - Vcc = 4.0 to 5.5 V (f(Xin) = 8 MHz, high-speed mode)
  - Vcc = 2.4 to 5.5 V (f(Xin) = 4 MHz, high-speed mode)
  - Vcc = 2.2 to 5.5 V (f(Xin) = 2 MHz, high-speed mode)
- Operating voltage (RC oscillation)
  - Vcc = 4.0 to 5.5 V (f(Xin) = 4 MHz, high-speed mode)
  - Vcc = 2.4 to 5.5 V (f(Xin) = 2 MHz, high-speed mode)
  - Vcc = 2.2 to 5.5 V (f(Xin) = 1 MHz, high-speed mode)
- Operating voltage (on-chip oscillator)
  - Vcc = 1.8 to 5.5V
- Low power consumption
  - 8MHz, double-speed mode, Vcc= 5V: TBD
- Operating ambient temperature: -20 to 85°C

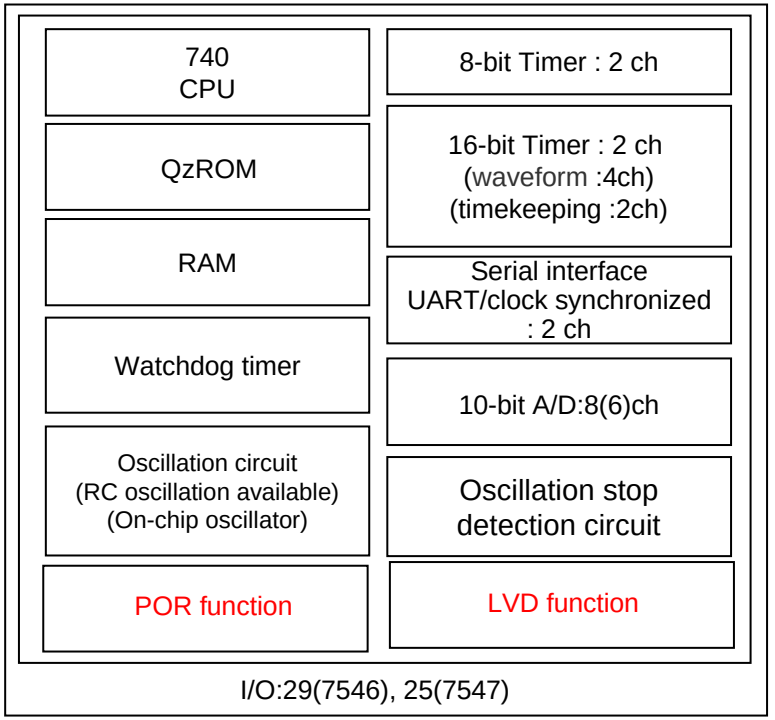
Applications

- Home appliances • Consumer appliances
- Industrial Equipment • PC peripheral OA equipment

Product Expansion ( ): ROM/RAM size **: Under development

- M37546G4-XXXSP/GP/HP**, M37546G4SP/GP/HP** (16K/512)
- M37547G4-XXXFP**, M37547G4FP** (16K/512)
- M37546G2-XXXSP/GP/HP**, M37546G2SP/GP/HP** (8K/384)
- M37547G2-XXXFP**, M37547G2FP** (8K/384)

SP : 32P4B : 32-pinSDIP (1.778mm pitch)
GP : 32P6U-A : 32-pin LQFP (0.8mm pitch)
FP : 36P2R-A : 36-pin SSOP (0.8mm pitch)
HP : 36PJW-A : 36-pin WQFN (0.8mm pitch)



M3850 Group (Spec. A)

Features

- Min. instruction execution time: 0.32 μs
  (oscillation frequency of 12.5 MHz in high-speed mode)Note1
- LED direct drive (port P1): 8 ch
- Low-voltage, high-speed operation (12.5 MHz)
- High-resolution multi-channel A/D converter
  (4 more channels than the H specs.)Note1
  Serviceable in low-speed mode
- Support for flash memory version
- Abundant peripheral functions
- Fewer external elements required for processing of unused pins: All pins are internally pulled up under software control.
- Operating voltage
  - Vcc = 4.0 to 5.5 V (f(Xin) = 12.5 MHz, high-speed mode)Note1
  - Vcc = 2.7 to 5.5 V (f(Xin) = 6 MHz, high-speed mode)Note1
  - Vcc = 2.7 to 5.5 V (f(Xin) = 12.5 MHz, middle-speed mode)Note1
  - Vcc = 1.8 to 5.5 V (f(Xin) = 6.3 MHz, middle-speed mode)Note2
  - Vcc = 2.7 to 5.5 V (f(Xcin) = 32 kHz, low-speed mode)
  - Vcc = 1.8 to 5.5 V (f(Xcin) = 32 kHz, low-speed mode) Note2
- Low power consumption (Mask ROM, QzROM version) :
  - 12.5 MHz, high-speed mode, Vcc = 5 V : 6.5 mA (typ.)
  - 32 kHz, low-speed mode, Vcc = 3 V : 20 μA (typ.)

Applications

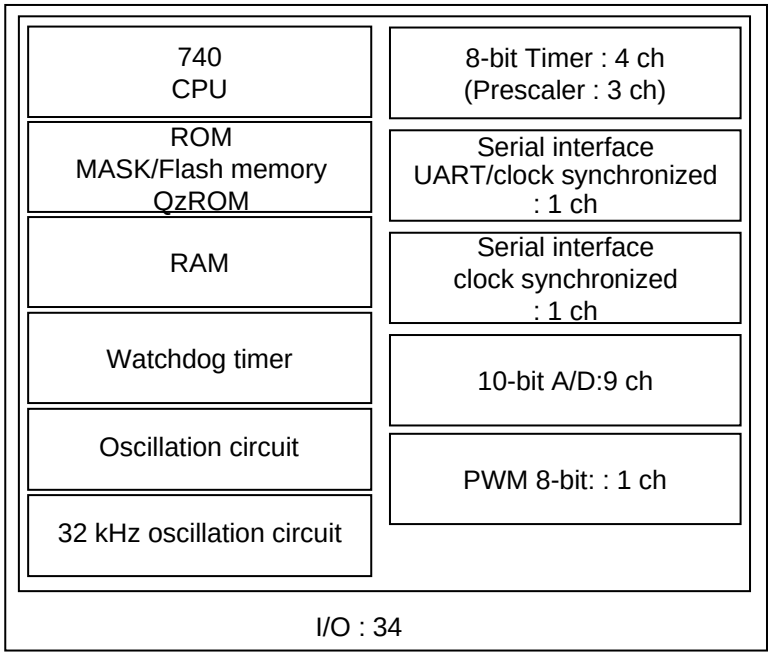
- Home appliances
  - Refrigerators, washing machines, air conditioners, microwave ovens, dishwashers, etc.
- Consumer appliances
  - Cameras, home audio systems, telephones, chargers, etc.

Note1: New specifications for the 3850 (spec. A)
Note2: New specifications for the 3850 (spec. A)QzROM

Product Expansion ( ): ROM/RAM size

- M38503M2A-XXXSP/FP (8K/512)
- M38503M4A-XXXSP/FP (16K/512)
- M38504M6A-XXXSP/FP (24K/640)
- M38507M8A-XXXSP/FP (32K/1K)
- M38507F8ASP/FP (32K/1K)
- M38503G4A-XXXSP/FP (16K/512)
- M38503G4ASP/FP (16K/512)

SP : 42P4B : 42-pin SDIP (1.778mm pitch)
FP : 42P2R-A/E : 42-pin SSOP (0.8mm pitch)



M3858 Group

Features

- Min. instruction execution time: 0.32 μs
  (oscillation frequency of 12.5 MHz in high-speed mode)
- LED direct drive (port P1): 8 ch
- Low-voltage, high-speed operation (12.5 MHz)
- Abundant peripheral functions
- Fewer external elements required for processing of unused pins: All pins are internally pulled up under software control.
- Operating voltage
  - Vcc = 4.0 to 5.5 V (f(Xin) = 12.5 MHz, high-speed mode)
  - Vcc = 2.7 to 5.5 V (f(Xin) = 6 MHz, high-speed mode)
  - Vcc = 2.7 to 5.5 V (f(Xin) = 12.5 MHz, middle-speed mode)
  - Vcc = 2.7 to 5.5 V (f(Xcin) = 32 kHz, low-speed mode)
- All 3850 products are completely pin-compatible.
- 16-bit timer of 2ch is added to 3850 group.

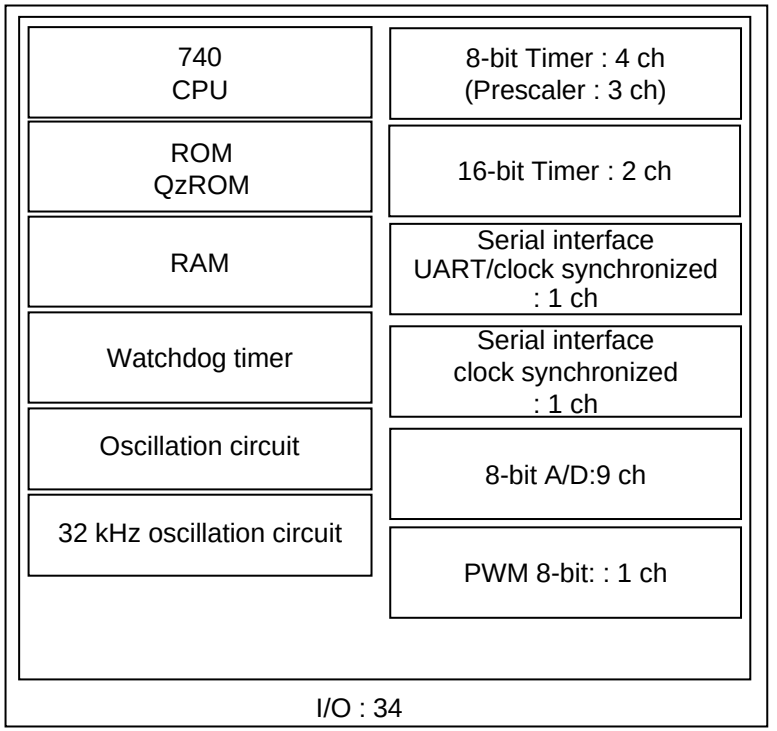
Note: A/D is 8-bit resolution.

Applications

- Home appliances
  - Refrigerators, washing machines, air conditioners, microwave ovens, dishwashers, etc.
- Consumer appliances
  - Cameras, home audio systems, telephones, chargers, etc.

Product Expansion ( ): ROM/RAM size

- M38588GC-XXXSP/FP (48K/1.5K)
  SP : 42P4B : 42-pin SDIP (1.778mm pitch)
  FP : 42P2R-A/E : 42-pin SSOP (0.8mm pitch)



M3803 Group (Spec. H)

Features

- Minimum instruction execution time: 0.24 μs (oscillation frequency of 16.8 MHz in high-speed mode)
- LED direct-drive ports: 8 ch (ave: 10 mA, peak: 20 mA, total current: 80 mA)
- Low-voltage, high-speed operation
- High-resolution multi-channel A/D converter
- Support for flash memory version
- Abundant peripheral functions, enhanced timer functions and communications functions
- Fewer external elements required for processing of unused pins: All pins are internally pulled up under software control.
- Operating voltage
  - Vcc = 4.5 to 5.5 V (f(Xin) = 16.8 MHz, high-speed mode)
  - Vcc = 4.0 to 5.5 V (f(Xin) = 12.5 MHz, high-speed mode)
  - Vcc = 2.7 to 5.5 V (f(Xin) = 8.4 MHz, high-speed mode)
  - Vcc = 2.2 to 5.5 V (f(Xin) = 4.2 MHz, high-speed mode)*Note
  - Vcc = 2.0 to 5.5 V (f(Xin) = 2.1 MHz, high-speed mode)*Note
  - Vcc = 1.8 to 5.5 V (f(Xin) = 6.3 MHz, middle-speed mode)*Note

  *Mask ROM, QzROM version only
- Low power consumption (Mask ROM version)
  - 16.8 MHz, high-speed mode, Vcc = 5 V : 8.0 mA (typ.)
  - 32 kHz,low-speed mode, Vcc = 3 V : 15 μA (typ.)
- Operating ambient temperature: -20 to 85°C

Applications

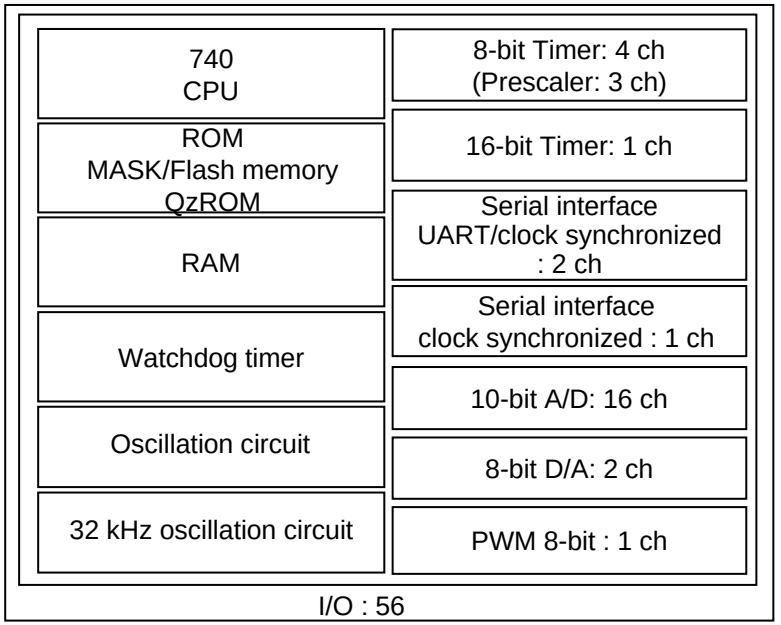
- Home appliances
- Audio systems
- Housing equipment
- OA equipment
- Amusement
- Communication systems

Product Expansion ( ): ROM/RAM size

*: New Product **: Under development

- M38039G4H-XXXHP/KP** (16K/2K)
- M38039G4HSP/HP/KP** (16K/2K)
- M38039G6H-XXXHP/KP** (24K/2K)
- M38039G6HSP/HP/KP** (24K/2K)
- M38039G8H-XXXHP/KP** (32K/2K)
- M38039G8HSP/HP/KP** (32K/2K)
- M38039GCH-XXXHP/KP** (48K/2K)
- M38039GCHSP/HP/KP** (48K/2K)
- M38039MFH-XXXSP/FP/HP/KP/WG (60K/2K)
- M38039FFHSP/FP/HP/KP/WG (60K/2K)(WG)

SP : 64P4B : 64-pin SDIP (1.778mm pitch) FP : 64P6N-A : 64-pin QFP (0.8mm pitch)
HP : 64P6Q-A : 64-pin LQFP (0.5mm pitch) KP : 64P6U-A : 64-pin LQFP (0.8mm pitch)
WG : 64F0G : 64-pin FLGA (0.65mm pitch)



M3823 Group

New Product

Features

- 4 COM x 32 SEG 80-pin product
- Pin compatibility with 3822 Group (Upward-compatible)
- Support QzROM
  (on-board serial writing possible)
- ROM correction function
  2 vectors x 32bytes
- Highly accurate low-voltage-operable 8(10)-bit A/D converter
  - At 2.0 to 2.2 V, ±3.0 LSB, at 2.2 to 5.5 V, ±2.0 LSB
- LED direct drive port : 33 (10 mA)
- Operating voltage
- - Vcc = 4.5 to 5.5 V (f(XIN) = 12.5 MHz, high-speed mode)
  - Vcc = 4.0 to 5.5 V (f(XIN) = 8 MHz, high-speed mode)
  - Vcc = 1.8 to 5.5 V (f(XIN) = 6 MHz, middle-speed mode)
  - Vcc = 1.8 to 5.5 V (low-speed mode)
- Low power consumption
- All 3822 products are completely pin-compatible
  and Software compatible
- Compact emulator (M38000T2-CPE) supported

Applications

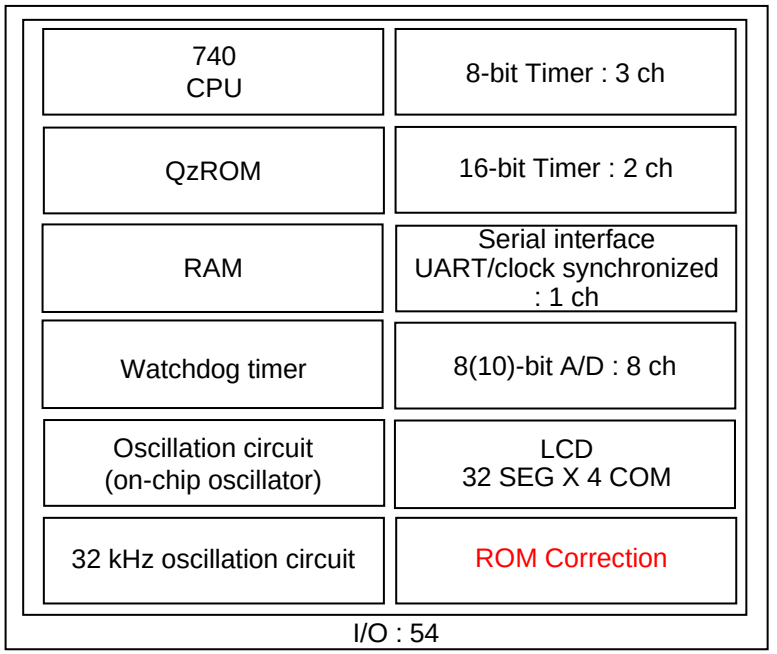
- Home appliances, Audio equipment, Microwave ovens,
  Compact cameras, Remote controllers, Body-fat measurers,
  Oil-fan heaters

Product Expansion ( ): ROM/RAM size

*: New product

- M38234G4-XXXFP/HP*,M38234G4FP/HP*(16K/640)
- M38235G6-XXXFP/HP* ,M38235G6FP/HP*(24K/768)
- M38238G8-XXXFP/HP ,M38238G8FP/HP (32K/1536)
- M38239GC-XXXFP/HP,M38239GCFP/HP (48K/2048)
- M3823AGF-XXXFP/HP,M3823AGFFP/HP (60K/2560)

FP : 80P6N-A : 80-pin QFP (0.8mm pitch)
HP : 80P6Q-A : 80-pin LQFP (0.5mm pitch)



M38D5 Group

Features

- 8-COM drive achieves display and I/O while staying in the 100-pin class
- Pin-compatible with 38C5-group products and software compatible.
- Support for QzROM version.
  (On-board writing is possible in serial mode.)
- ROM correction function: 2vector x 32bytes
- LED direct drive port : 6(15 mA), 21(10 mA)
- Highly accurate low-voltage-operable 10-bit A/D converter x 8
- Operating voltage (QzROM version)
  - Vcc = 4.5 to 5.5 V (f(Xin) = 12.5MHz, high-speed mode)
  - Vcc = 4.0 to 5.5 V (f(Xin) = 8MHz, high-speed mode)
  - Vcc = 1.8 to 5.5 V (f(Xin) = 5MHz, middle-speed mode)
  - Vcc = 1.8 to 5.5 V (low-speed mode)
- Low power consumption
- On-chip oscillator mode for even lower power consumption
  f(Ø)=f(ROSC)/32
  (2.5 V operation: typ.35μA, at WAIT: typ. 25μA)
  (Stop function and fixed clock are added.)
- Enhanced WDT function
- Compact emulator (M38000T2-CPE) supported

Applications

- Measuring devices, IH controllers, Cameras, Audio equipment, Home appliances

Product Expansion ( ): ROM/RAM size

*: New Product **: Under development

- M38D58G8-XXXFP/HP* ,M38D58G8FP/HP* (32K/1536)
- M38D59GC-XXXFP/HP**,M38D59GCFP/HP**(48K/2048)
- M38D59GF-XXXFP/HP**,M38D59GFFP/HP**(60K/2048)
- M38D59TFFP/HP** (Tool for program development)

  FP : 80P6N-A :80-pin QFP (0.8mm pitch)
  HP : 80P6Q-A :80-pin LQFP (0.5mm pitch)

740 CPU	8-bit Timer : 4 ch (PWM 10-bit : 2 ch)
QzROM	16-bit Timer : 2 ch (PWM 16bit: 2) (Event counter 18-bit : 1 ch)
RAM	Serial interface Clock synchronized : 1 ch
Watchdog timer	Serial interface UART/clock synchronized : 1 ch
Oscillation circuit (On-chip oscillator)	10-bit A/D : 8 ch
32 kHz oscillation circuit	LCD 36 SEG X 4 COM (32 SEG X 8 COM)
	ROM correction function

I/O : 61

M38D2 Group

Features

- Additional peripheral function version of 38C2 Group
- Pin-compatible with 38C2-group products (upwardly compatible)
- Support for QzROM version. (On-board writing is possible in serial mode.)
- ROM correction function: 2vector x 32bytes
- Built-in on chip oscillator: f(Ø)=f(ROSC)/32
- LED drive port: 10(15mA), 41(10mA)
- Built-in division resistance for LCD power supply
- Low current consumption
- Enhanced WDT function (Selectable counter source)
- Compact emulator (M38000T2-CPE) supported

Applications

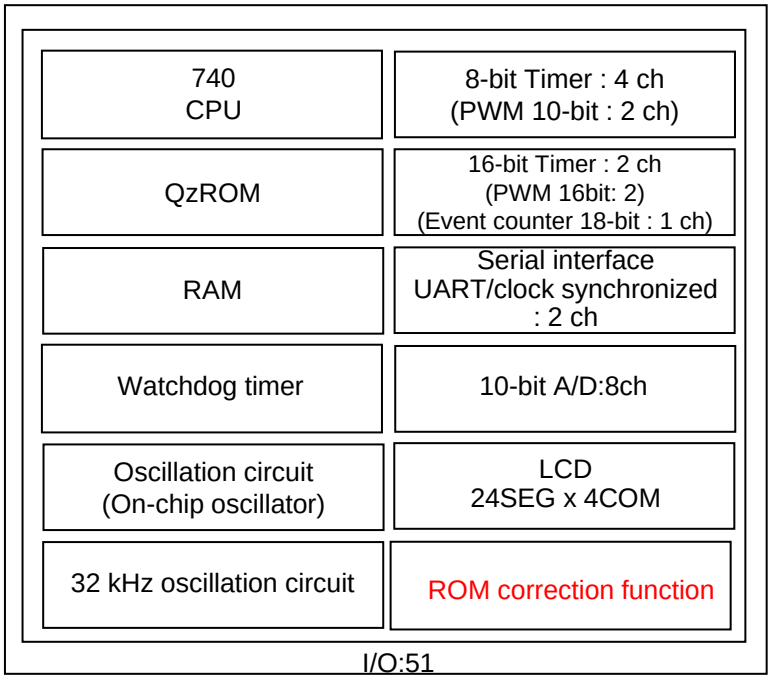
- Measuring devices, IH controllers, Cameras, Home appliances

Product Expansion ( ): ROM/RAM size

: Under development *: In planning

- M38D24G4-XXXFP/HP** ,M38D24G4FP/HP** (16K/640)
- M38D24G6-XXXFP/HP** ,M38D24G6FP/HP** (24K/640)
- M38D28G8-XXXFP/HP** ,M38D28G8FP/HP** (32K/1536)
- M38D29GC-XXXFP/HP** ,M38D29GCFP/HP** (48K/2K)
- M38D29GF-XXXFP/HP** ,M38D29GFFP/HP** (60K/2K)
- M38D29TFFP/HP*** (Tool for program development)

FP : 64P6U-A : 64-pin LQFP (0.8mm pitch)
HP : 64P6Q-A : 64-pin LQFP (0.5mm pitch)

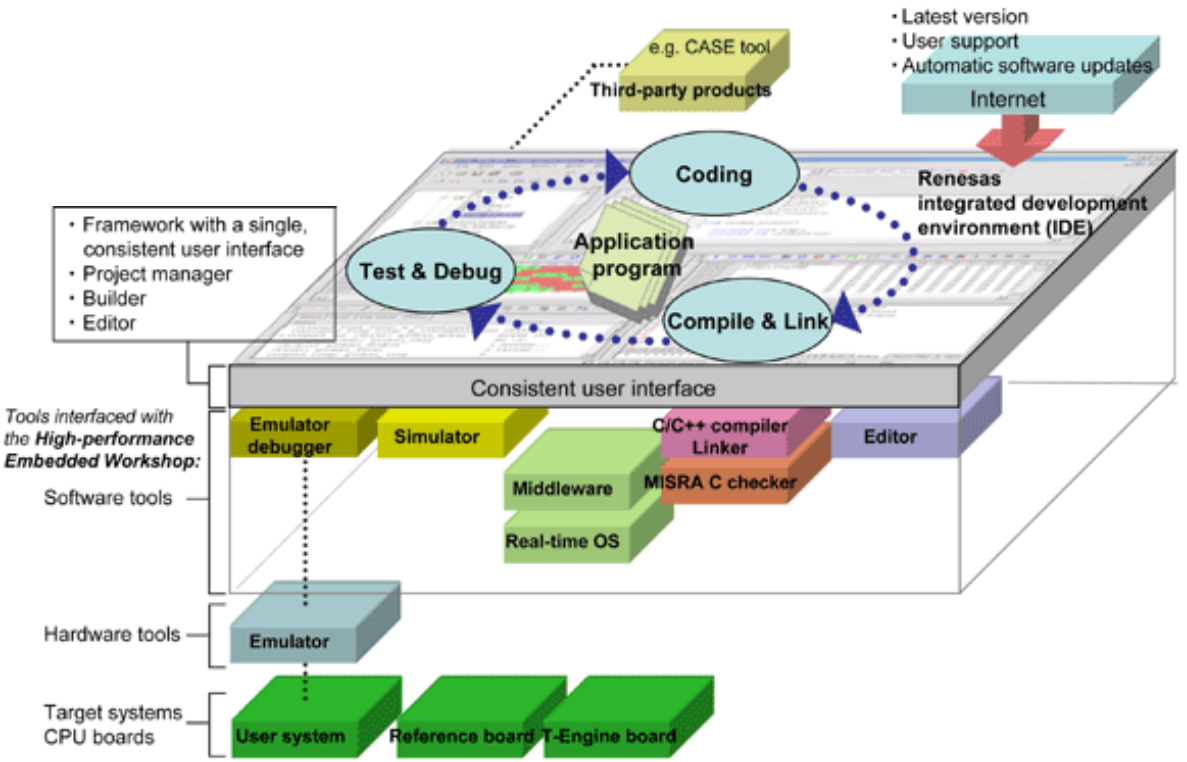


QzROM Microcomputer
Development Environment

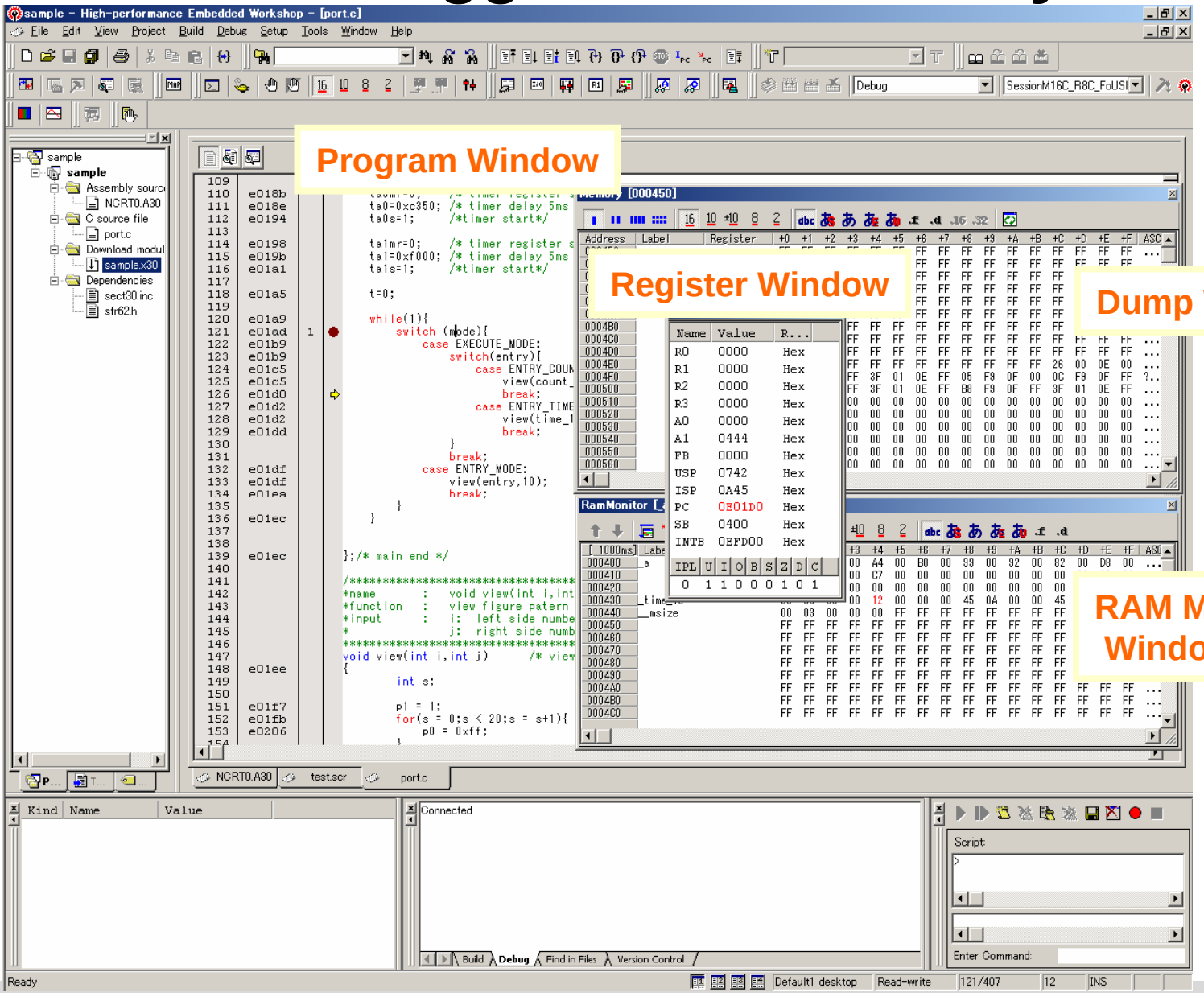
High-performance Embedded Workshop

Features

- Seamless development environment
- Comfortable operability that
  can concentrate on development
- Great project management
- Useful embedded editor
- Cooperation with external tools
- Network support
- Easy creation of environment (install)
- Auto-updater



HEW debugger for 740 Family ★★



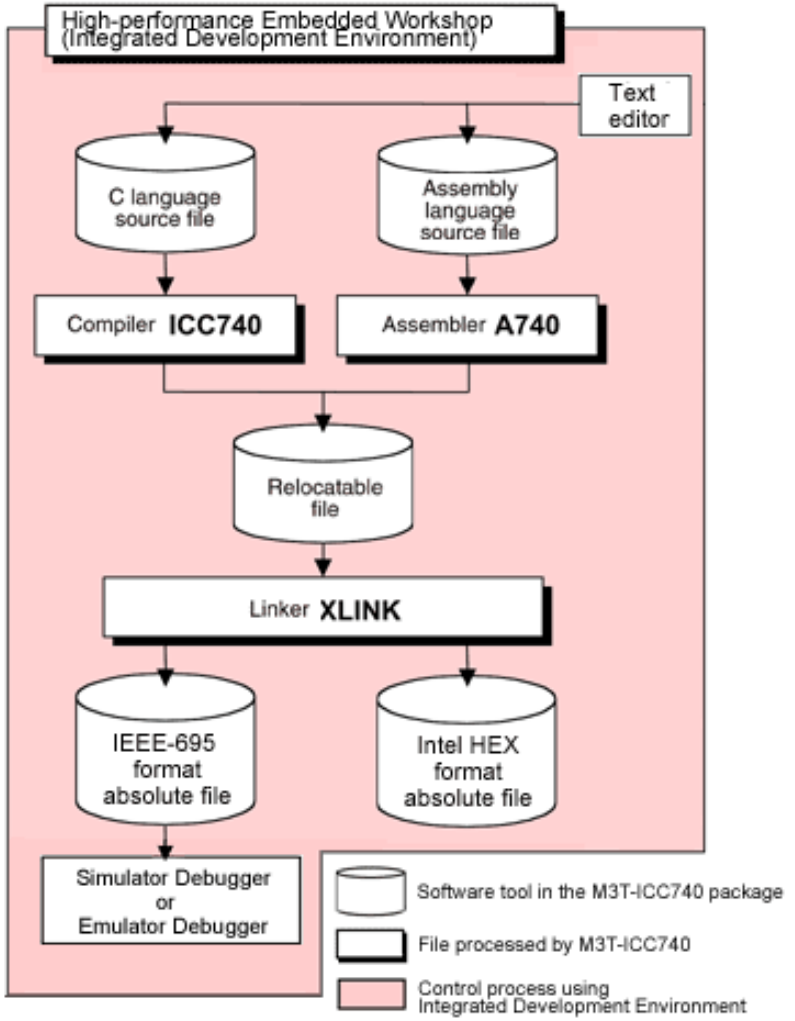
★★ : Under development

C compiler package for 740 family M3T-ICC740

Features

- It corresponds to integrated development environment TM from Renesas
- ISO/ANSI standard C compiler
- The highly efficient optimizer which specialized in 740 family, C extension function
- It's full of assembler pseudo-operation and operator set
- It corresponds to various object formats starting with ieee695. (It realizes compatibility with PC4701U etc.)
- It supports a library function.
- Bundled simulator debugger M3T-PD38S
- Bundled source file converter SC74 (It made source of M3T-SRA74 operational.)
- Application note

"740 Family Programming Guidelines (C Language)" is attach



Contact

Tool technical support window : csc@renesas.com

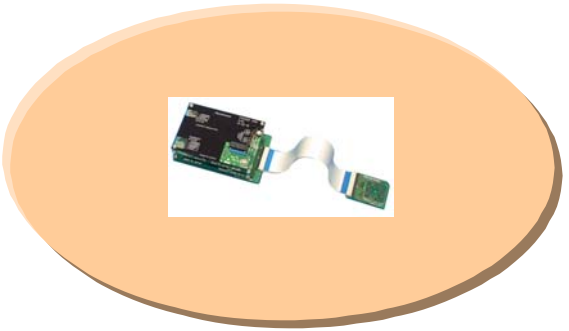
M3T-ICC740 Homepage

http://www.renesas.com/fmwk.jsp?cnt=m3t_icc740_tools_product_landing.jsp&fp=/products/tools/coding_tools/c_compilers_assemblers/m3t_icc740/&site=i

Emulator Lineup For 740 Family

Function

Compact emulator



Real time emulation is possible
and compact, low cost and tools are all-in-one.

On-chip debugging emulator

Under development

E8

Real time debug and easy connection with devices.

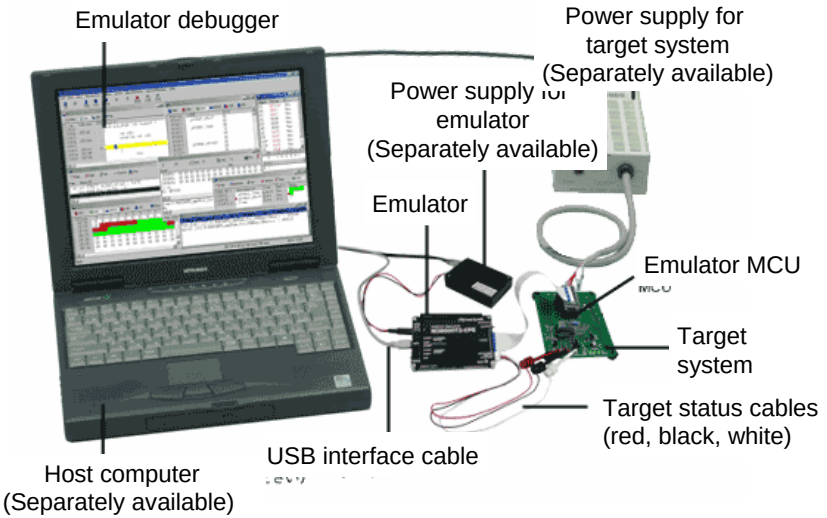
Study, evaluation — **Small or medium scale development** — **Large scale development**

Compact Emulator for the 740 Family

- Outline
  - As the succession emulator of simple tool system (M38517T-PAC etc.), compact emulator equips with useful function such as real time trace etc.
  - Emulator MCU method is adopted as well as M38000TL2-FPD, it can support main MCUs.
  - It is all-in-one component that includes software tools (limited function version of M3T-SRA74)

- Functions
  - Equipped with the real-time trace function, the hardware break function, and real-time RAM monitor function.
  - Communication I/F is USB.
  - Corresponds to the low voltage operation and RLFS/RLSS.

★: New product
★★: Under development
☆: In planning



M38000T2-CPE system configuration

On-chip debugging emulator for 740 Family★★

- Outline

The E8 is a compact, smart debugging environment package

- Realize actual chip debugging
  E8 allows the user to perform complete system debug, from MCU operations to electrical characteristics, in a state close to actual operations of the final product.

- The Renesas integrated development environment "High-performance Embedded Workshop“
  It provides smooth links between the emulator debugger and a variety of development software tools, such as the C compiler and simulators. The result is the creation of a seamless tool chain enabling highly efficient program development through integrated interfaces, from coding to building and debugging.

- Reasonably priced and packed with special features
  E8 product packages are ready for system development and debugging the minute they reach the user,bundling cross tools for immediate connection and all necessary cables to the target system.
  Reasonably priced and packed with special features, E8 products fully support speedy market-entry.

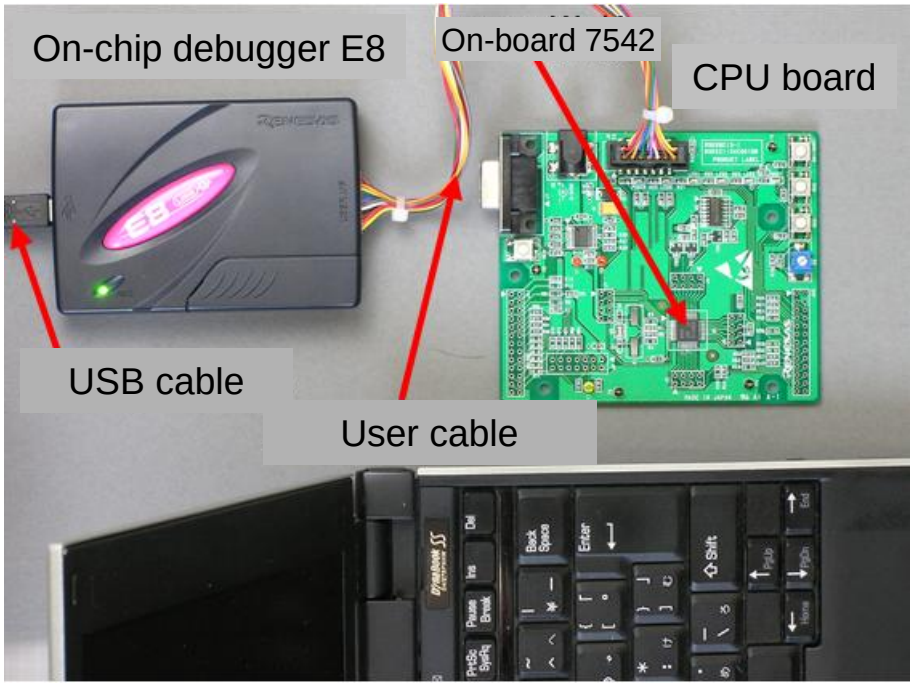
★★ : Under development

7542(QzROM:for 7546/47) Starter Kit
(Type name is undecided)

Under development

All-in-one Package

QzROM:included development tools for 7546/47.



7542 Starter Kit includes voltage converter board for programming of 7546/47.

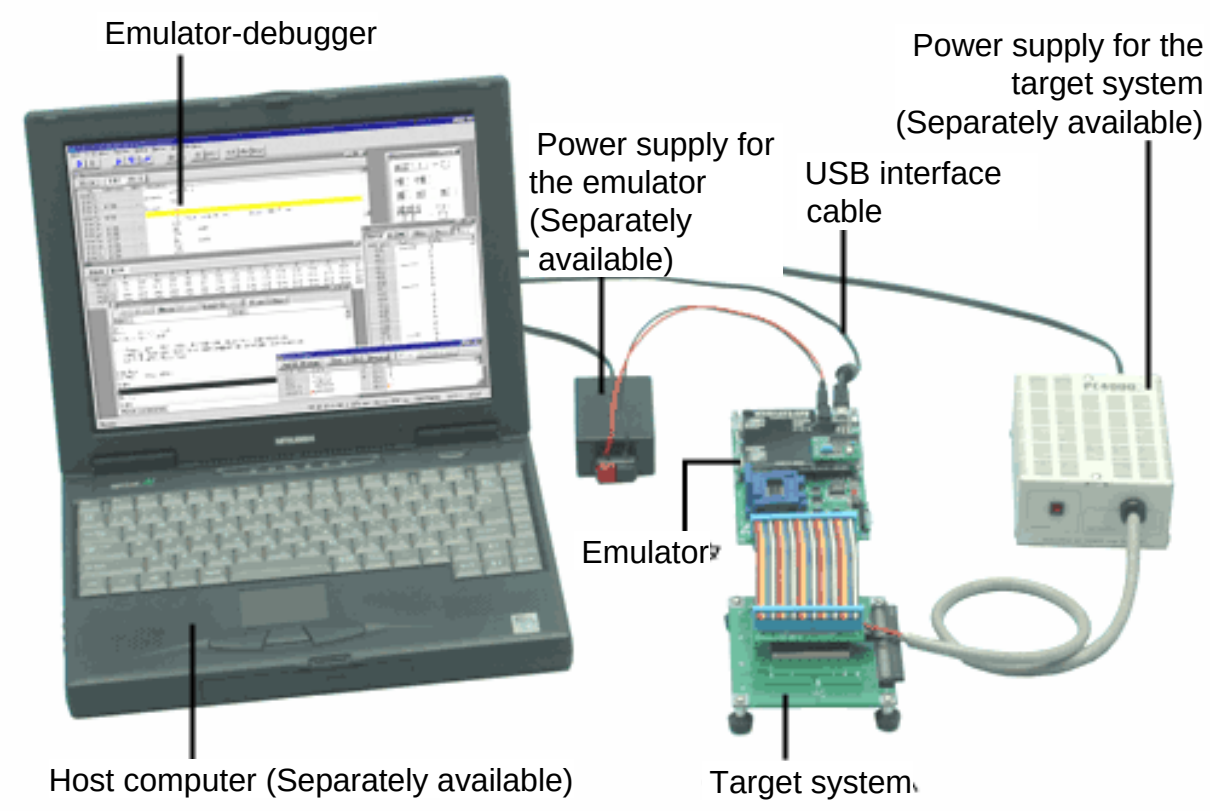
Development Tools for the 720 Family

Lineup of Compact emulator

Series	Group	Compact emulator
4500	4518, 4519	M34519T2-CPE
	4552, 4553, 4556	M34552T2-CPE
	4508, 4509	M34509T2-CPE
	4571	M34571T2-CPE
	4559	M34559T2-CPE
720	4282, 4283	M34282T2-CPE

Compact Emulator for the 4500 Series (2)

2. Example of Connecting the 4500-Series Compact Emulator



Compact emulator body

Note: The M34509T2-CPE is shown above.

Programmer for QzROM: Suisei Electronics System Co.,Ltd. (1)

Features

- Economical Replaceable Unit System

It is possible to program on-board by connecting the main unit and serial unit to the user target board. Even if there is no user target board, on-board programming is possible by connecting with MCU unit.

- Flexibly supports various future MCUs

Simplified programming units made easy and economical to support new MCUs.

- Space-saving
- EFP-RC is stand-alone machine.

It is a stand-alone machine based on EFP-S2.
It incorporates compact Flash and can preserve HEX files though it's compact.
Programming is easy.

EFP-S2V
EFP-S2
connected with PC by USB

EFP-RC
Stand-alone operation

EFP-I
connected with PC by serial

Programmer for QzROM: Suisei Electronics System Co.,Ltd. (2)
Unit List

Main unit	Serial unit	Remarks
EFP-S2 EFP-S2V	EF1SRP-01US2	-
	EF1SRP-05U	For replaceable Unit EF1CNT-96P is necessary.
EFP-RC	-	Voltage conversion board EFXQZP-01 is necessary.
EFP-I	EF1SRP-05U	-

•EFP-S2V is the lower-cost alternative which has the same function as EFP-S2 and smaller memory capacity.

This list has products which are under development.

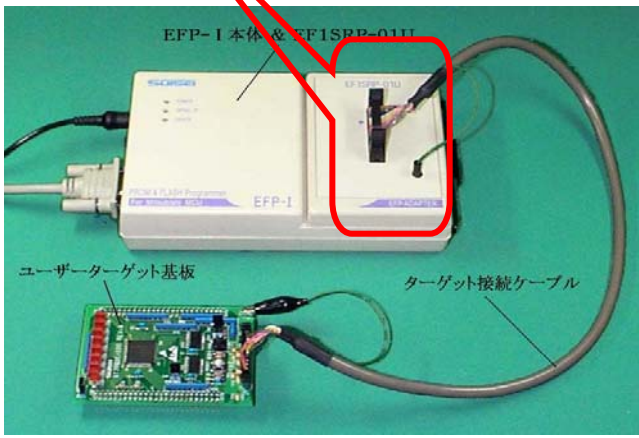
For details, please contact
Suisei Electronics System Co.,Ltd.

QzROM's Programming tool → Suisei Programmer

● MCU socket & QzROM pairing table

MCU socket	Correspond MCU
MS4238-20F	M34508G4FP, M34508G4HFP
MS4502-24F	M34509G4FP, M34509G4HFP
MS4508-20G	M34508G4GP, M34508G4HGP, M34283G2GP
MS4559-52H	M34559G6FP
MS4502-24F	M34571G4FP, M34571G6FP, M34571GDFP
MS3803-64H	M38039G4HHP, M38039G6HHP, M38039G8HHP, M38039GCHHP
MS3803-64U	M38039G4HKP, M38039G6HKP, M38039G8HKP, M38039GCHKP
MS3803-64S	M38039G4HSP, M38039G6HSP, M38039G8HSP, M38039GCHSP
MS7544-32F	M37544G2AGP, M37545G4GP, M37545G6GP,M37545G8GP, M37546G2GP, M37546G4GP
MS7544-32S	M37544G2ASP, M37546G2SP, M37546G4SP
MS7545-36E	M37547G2FP, M37547G4FP
M37546-36K	M37546G2HP, M37546G4HP
MS3850-42E	M38503G4AFP, M38588GCFP
MS3850-42S	M38503G4ASP, M38588GCSP
MS3823-80F	M38234G4FP, M38235G6FP, M38238G8FP, M38239GCFP M3823AGFFP
MS3823-80H	M38234G4HP, M38235G6HP, M38238G8HP, M38239GCHP M3823AGFHP
MS38D2-64U	M38D24G4FP, M38D24G6FP
MS38D2-64H	M38D24G4HP, M38D24G6HP
M38D5-80F	M38D58G8FP, M38D59GCFP, M38D59GFFP
M38D5-80H	M38D58G8HP, M38D59GCHP, M38D59GFHP
MS3882-80H	M38827G5HP

Program QzROM MCUs needs to use with suitable MCU's socket adaptor.



QzROM's Programming tool

Hi-Lo Sys. Programmer

http://www.hilosystems.com.tw

Support List for QzROM

Type		ALL-100	ALL-11
M34283G2GP	SSOP20	Support	Support
M37544G2AGP	LQFP32	Support	Support
M37544G2ASP	SDIP32	Support	Support
M37546G4SP	SDIP32	Support	Support
M38503G4ASP	SDIP42	Support	Support
M38503G4AFP	SSOP42	Support	Support
M38039GCHKP	LQFP64	Support	Support
M38234G4FP	QFP80	Support	Support
M38235G6FP	QFP80	Support	Support
M38238G8FP	QFP80	Support	Support
M38239GCFP	QFP80	Support	Support
M3823AGFFP	QFP80	Support	Support
M3823AGFHP	LQFP80	Support	Support
M38588GCFP	SSOP42	Support	Support
M38588GCSP	SDIP42	Support	Support

ALL-100

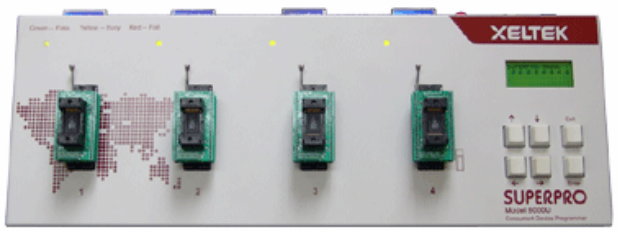
ALL-11

QzROM's Programming Tool ➡ XELTEK Programmer

Support List for QzROM

http://www.xeltek.com/home.php

Type		SP9000u	SP3000u	SP580u
M34283G2GP	LSSOP20	Support	Support	Support
M34508G4(H)FP	SOP20	Support	Support	Not Support
M34508G4(H)GP	LSSOP20	Support	Support	Not Support
M34509G4(H)FP	SSOP24	Support	Support	Not Support
M37544G2A(SP)	SDIP32	Support	Support	Support
M37544G2A(GP)	LQFP32	Support	Support	Support
M37546G2/G4（HP)	QWFN36	Support	Support	Support
M37546G2/G4（GP)	LQFP32	Support	Support	Support
M37546G2/G4（SP)	SDIP32	Support	Support	Support
M37547G2/G4(FP)	SSOP36	Support	Support	Support
M38503G4A(FP)	SSOP42	Not Support	Support	Support
M38503G4A(SP)	SDIP42	Not Support	Support	Not Support



SP9000u

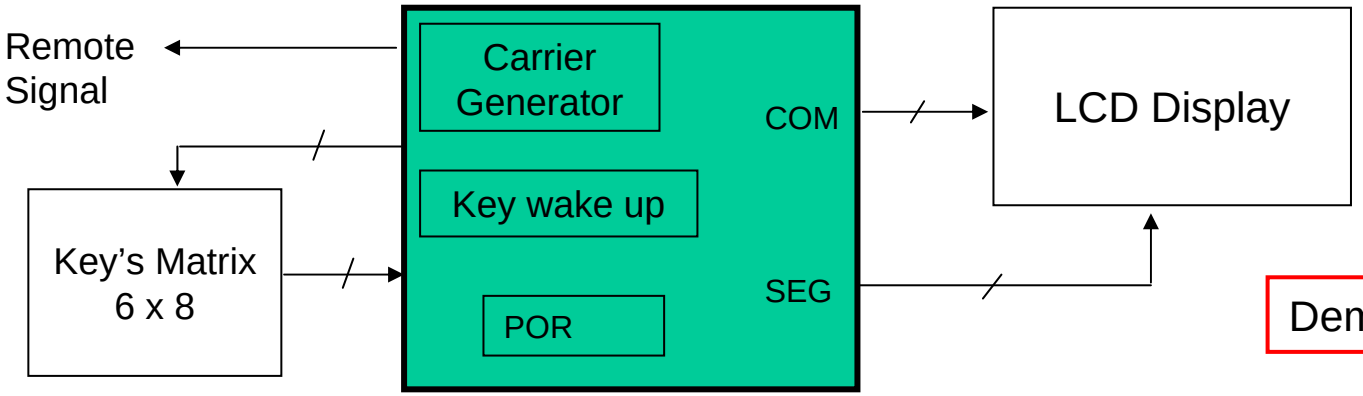
SP3000u

SP580u

Home Appliances and Consumer Applications by using QzROM

Application：LCD Remote Control for Air Conditioner

M34559,6K Word,52 Pins QFP



Demo

Function's comparison Table

MCU Series	M34552	M34553	M34559
ROM/RAM	4/8K ,288word	4/8K ,288word	6K, 288word
PACKAGE	48 Pins QFP(0.65mm)	48 Pins QFP(0.5mm)	52 Pins QFP(0.65mm)
LCD SEG	28 SEG x 4 COM	29 SEG x 4 COM	32 SEG x 4 COM

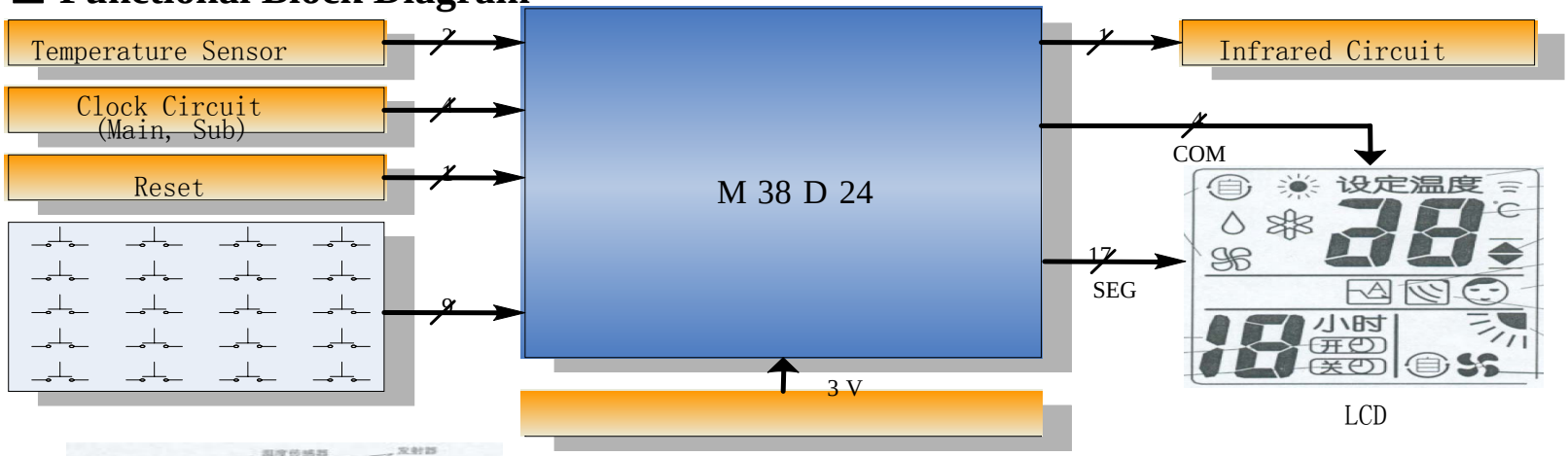
- QzROM scan key input
- QzROM drive LCD
- QzROM control PWM

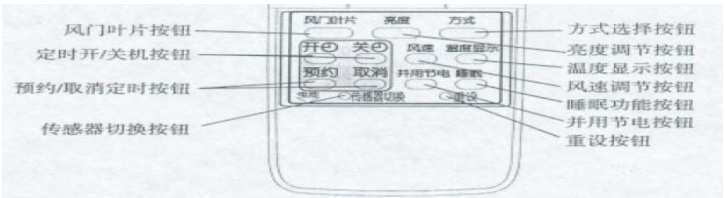
QzROM for Air-con LCD remote controller

M38D24 Features

- PWM --- 16bit x 1
- A/D converter --- 10 bit x 8 channels
- LCD drive control --- 32 SEG × 4 COM
- Power voltage - VCC = 1.8 to 3.6 V (4MHz, f(xin)/4 mode)
  - VCC = 1.8 to 3.6 V (32KHz, low-speed mode)

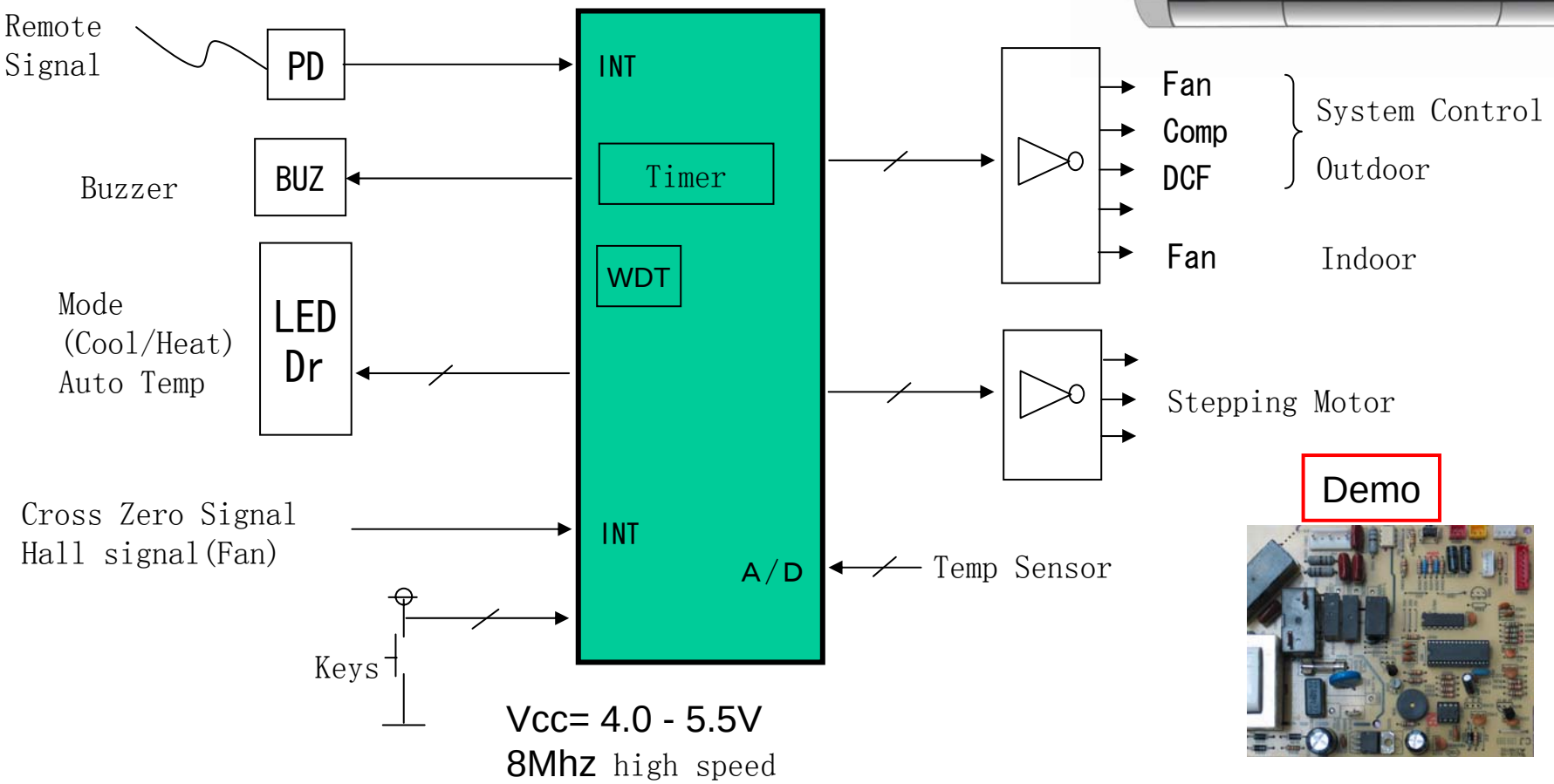
Functional Block Diagram





Application； Air Conditioner (General)

M37544G2ASP; 8K,32 Pins SDIP,8Mhz



Demo

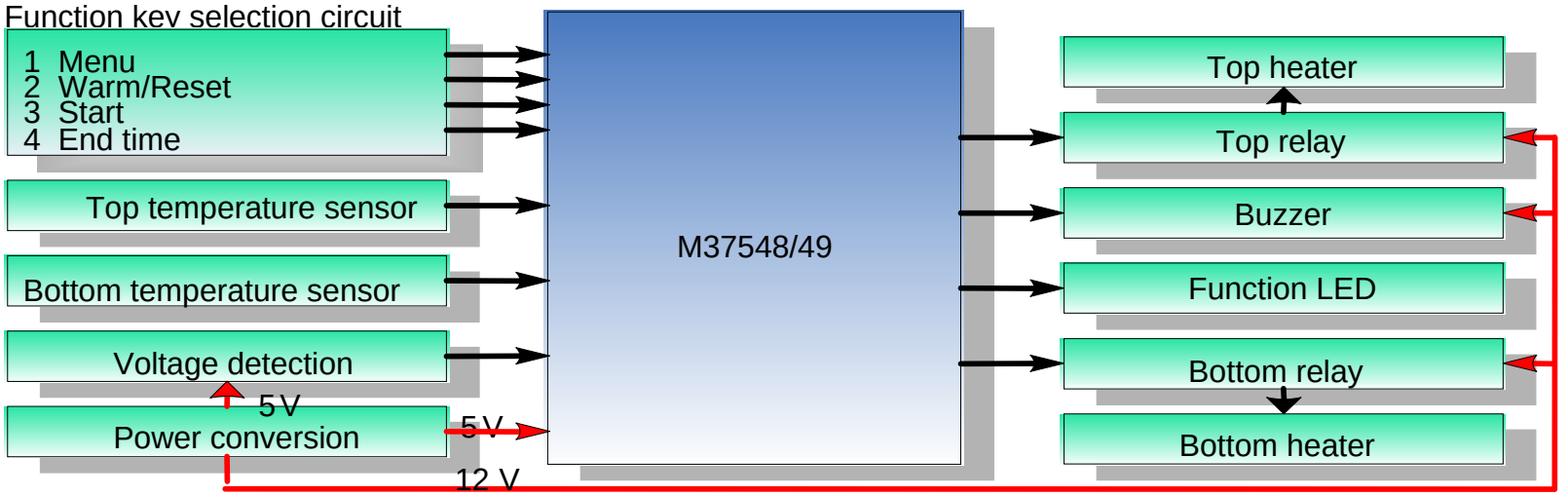
- QzROM scan key input
- QzROM drive LCD
- QzROM acquire TMP sig.

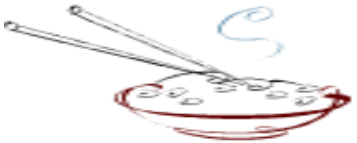
QzROM for Rice Cooker

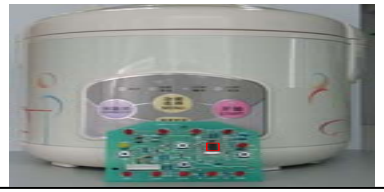
M37548/49 Features

- Power On (POR) and Low voltage Detect (LVD)
- 10 bit multi-channel A/D converter
- Power Voltage - VCC = 4.0 to 5.5 V (8MHz, High-speed mode)
  - VCC = 1.8 to 5.5 V (1MHz, High-speed mode)

Functional Block Diagram







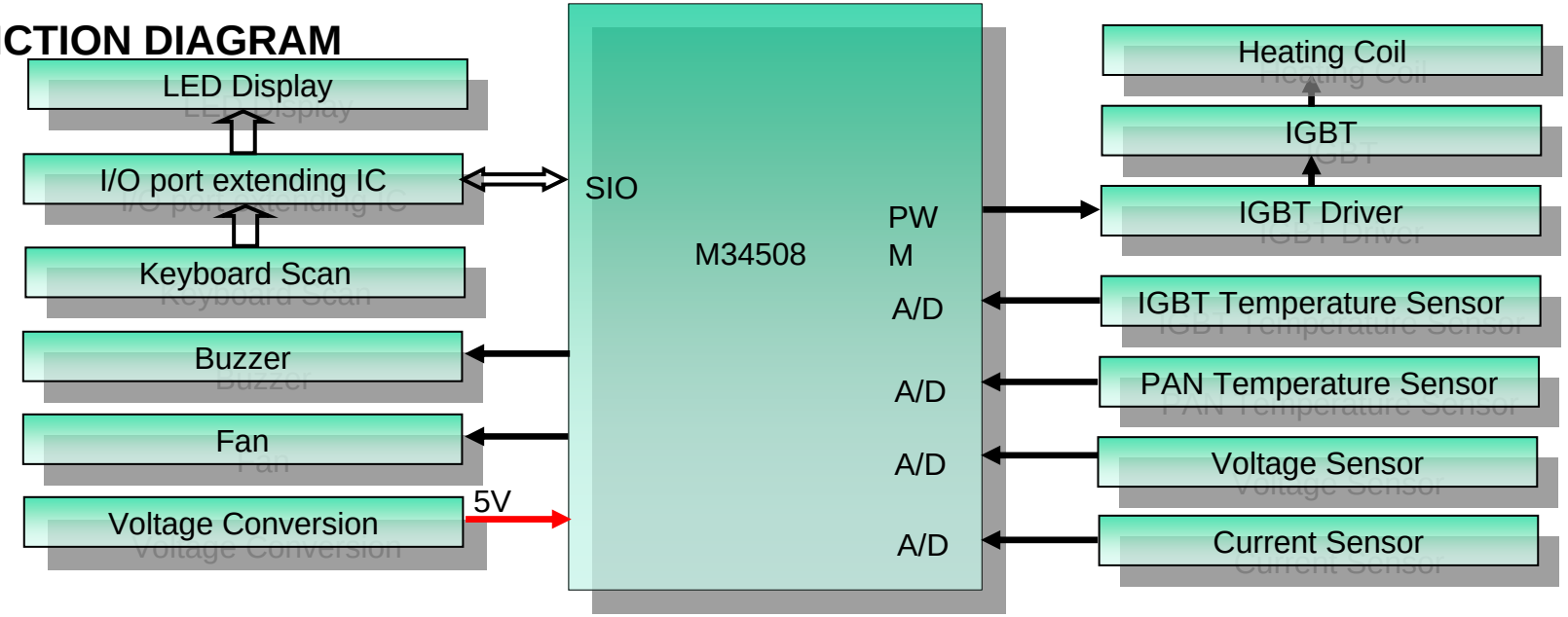
- QzROM Control I/O extending
- QzROM Measure T、V、C Signal
- QzROM Control PWM output

QzROM for IH Cooker

M34508 FEATURES

- Input/Output port：14
- A/D Converter：10-bit × 4 Channels
- Serial Interface：1 Channel
- Supply Voltage： VCC = 1.8 to 5.5 V （It depends on operation source clock, oscillation frequency and operating mode）

FUNCTION DIAGRAM



- QzROM Scan Keyboard
- QzROM Control LED
- QzROM Measure Temperature
- QzROM Control Relay

QzROM for Microwave Oven

■ M37544/6 FEATURES

- Programmable I/O Port：25
- A/D Converter：8/10-bit ×6 Channels
- Memory Size：8KB/16KB ROM，256B/512B RAM
- Supply Voltage：VCC = 1.8 to 5.5 V（It depends on oscillation frequency and operating mode）

■ FUNCTION DIAGRAM